Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of:	)	
	)	
International Comparison and Consumer Survey Requirements in the Broadband Data Improvement Act	)	GN Docket No. 09-47
	)	GN Docket No. 09-51
A National Broadband Plan for Our Future	)	
	)	
Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act	)	GN Docket No. 09-137

NBP PUBLIC NOTICE # 26

COMMENTS OF LIN TELEVISION CORPORATION

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Table of Contents

Summary ii

COMMENTS OF LIN TELEVISION CORPORATION 1

Preliminary Statement 3

Responses 5

A.1. What factors should the Commission consider when examining and comparing the benefits of spectrum used for over-the-air television broadcasting and those of spectrum used for wireless broadband services? *5*

A.2. What would be the impact to the U.S. economy if insufficient additional spectrum were made available for wireless broadband deployment, in terms of investments, jobs, consumer welfare, innovation, and other indicators of global leadership? *7*

A.5(a). How do broadcasters plan to use licensed spectrum in the future? What innovations in applications, services, or business models will create synergies between broadband and broadcast services, or other new value from currently licensed spectrum? *19*

B.1. What are the advantages of a channel-sharing approach to broadcasters' business? What are the disadvantages of this approach? What are the technical and business requirements to enable successful channel sharing? *20*

B.2. What opportunities exist to free up broadcast spectrum through greater collocation of transmission facilities closer to the center of densely populated areas? There are numerous examples of broadcasters collocating facilities already. What are the financial and other benefits of collocation? What are the tradeoffs for broadcast TV stations and consumers in terms of signal coverage and local programming efforts? *20*

B.3. How will video capabilities improve over time using current MPEG-2 and 8-VSB technologies? What improvements could be gained by deployment of next generation technologies over that currently achieved under the ATSC standard? What would be required for broadcasters and consumers to transition to more advanced technologies? *21*

B.4. To what extent would establishing antenna and receiver standards facilitate spectral efficiency and improved reception in broadcasting? What other actions could the FCC take to enable broadcasters to make more efficient use of their spectrum? *21*

D. What market-based or other incentive mechanisms should the Commission consider to enable broadcasters to choose whether or not to make any spectrum (excess or otherwise) available for reallocation to wireless broadband use? *25*

Summary

The basic premise of *Public Notice #26*, that the U.S. faces a severe nationwide shortage of spectrum from wireless broadband, has no foundation in the record. LIN Television Corporation ("LIN") believes *Public Notice #26* should have acknowledged that the need for additional spectrum has been disputed. If the National Broadband Plan projects a shortage of spectrum for wireless broadband, at a minimum it must acknowledge that there is an absence of substantial evidence for this projection and that the record shows contradictory evidence. Moreover, if the National Broadband Plan proposes broadcast spectrum reallocation as a policy option, it should state that the option was first considered late in the process and that broadcasters were given little time to respond to sweeping questions on a wide range of topics.

Public Notice #26 asks what factors the Commission should consider when comparing the benefits of spectrum used for over-the-air television broadcasting and those of spectrum used for wireless broadband services. The FCC itself defined most of those considerations when it chose to regulate broadcasting heavily and to regulate wireless services lightly. Extensive regulations restrict the ability of television broadcasters to respond to market demands. Every regulation imposed on broadcasters reflects a non-market value judgment made by Congress or the FCC. Regulation of commercial wireless carriers' use of spectrum is minimal compared to the pervasive regulation the FCC imposes on television broadcasters. Beyond disparate FCC regulations, there is little to distinguish a broadcast service provider and a wireless service provider in their ability to deploy new technologies or adopt new business models to meet changing public demands and expectations. Differences in what some may perceive to be "efficient" use of spectrum and other resources arise exclusively from value judgments embodied in the FCC's regulations.

Those who argue for reallocation of broadcast spectrum make several basic errors:

1. Those warning of a looming national spectrum crisis miss the fact that, if there ever is an actual shortfall, it will likely affect only small geographic areas, and those areas will be the most heavily provisioned with alternative broadband infrastructure – fiber, copper, fixed wireless, unlicensed wireless and nomadic wireless access – in the entire country.

2. Reallocation proponents should be more candid in their presentation and use of statistics. CTIA uses free, unlicensed Wi-Fi traffic statistics to support its argument that wireless carriers are running out of spectrum. CTIA also uses incomplete statistics to claim that U.S. carriers are among the most efficient in the world, when the U.S. actually has vastly more allocated mobile wireless spectrum than nine of the top ten Organization for Economic Co-Operation and Development ("OECD") nations when population density is considered.

3. Predictions of a severe spectrum shortfall are predicated on wireless carriers maintaining and increasing their highly inefficient spectrum use, including the assumption that mobile networks will be used to carry a significant amount of traffic that is not mobile at all. Apparently, CTIA wants additional spectrum allocations so wireless carriers can displace high speed wireline connections into the home, a phenomenon they call "fixed-mobile substitution." CTIA's projections assume that a significant number of Americans will drop their home broadband connections, go mobile-only, and use those mobile connections to download high definition video for viewing at home. The Commission should consider whether using mobile wireless spectrum for these purposes is efficient and consistent with public policy, and whether broadcast spectrum should be reallocated so that wireless carriers can displace high speed fixed broadband lines.

The Commission should also consider the extent to which relatively simple steps can dramatically reduce the traffic that passes through mobile operators' base stations. It is possible that efforts in other countries to support traffic with nomadic links such as Wi-Fi and femtocells when appropriate is one of the reasons they are able to support much higher density populations with far less bandwidth, relatively speaking, than U.S. carriers are able to support. There is evidence that U.S. carriers are beginning to embrace nomadic links as traffic management tools. As Peter Rysavy of Rysavy Research recently observed, "letting 3G subscribers use hotspots free isn't benevolence; operators are trying to off-load as much data as they can onto Wi-Fi."[1]

If a full and fair consideration of evidence suggests that more wireless spectrum will eventually be needed in certain densely populated metropolitan areas, the FCC will need to find a way to close the gap. The point is not for LIN to predict where and when more spectrum may be productively used for mobile broadband services. The point is that those who insist a spectrum crisis dire enough to affect America's global competitiveness is just around the corner need to provide far more granular facts and much more rigorous logic to support their case.

Channel sharing is not a realistic option under the FCC's existing television broadcast regulatory regime, because the net effect would be to reduce the scale of a business that is already kept far too small by FCC regulations. Broadcasters already have substantial economic, technical and practical incentives to collocate, so the degree of collocation that exists today probably reflects, in the aggregate, the most efficient collocation factor that is achievable in a practical and economically sensible way. It is unlikely that collocation could free up enough spectrum to support an additional national wireless service allocation.

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[1] *Spectrum Crisis*, Information Week, October 26, 2009 at 23, 24-26 (available at http://rysavy.com/Articles/2009_10_Spectrum_Crisis.pdf).

Public Notice #26 asks how new technologies might improve the broadcast service offering and how the FCC can facilitate the evolution of the television broadcast service and more efficient use of spectrum. Many of the answers lie in the regulatory approach the FCC has applied, with great success, to commercial mobile wireless services. Broadcasters can adopt new and more competitive business approaches and deploy new technologies faster if the existing spectrum caps – the broadcast ownership limits – are raised and if the FCC's technical rules are relaxed. Limits on scale and technical flexibility impose costly burdens on broadcasters and have greatly slowed the pace of evolution of broadcast technology and services. Consumers ultimately pay these costs in one form or another.

Being competitive in the communications marketplace in 2010 and beyond means having enough scale to address a national market, or to provide a game-changing service in a local market. These options – almost universally understood to be essential elements for competitive mobile services – are not available to any U.S. broadcaster. LIN has invested heavily to deploy more efficient systems and technologies, but the FCC's broadcast spectrum caps – its ownership limits – unduly restrict LIN's ability to achieve operating efficiencies enjoyed by large mobile carriers. The FCC's ownership rules have balkanized television broadcasting. However effective those rules might have been decades ago, when competition was limited and innovation was rare, they are profoundly counterproductive today, when competition is fierce and innovation is expected. The best way for the FCC to help broadcasters transition to new technologies and use spectrum more efficiently is to lift unnecessary regulations. Deregulation will lead directly and quickly to substantial gains in the quality, amount and accessibility of free television broadcast services for the American public.

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NBP PUBLIC NOTICE # 26

COMMENTS OF LIN TELEVISION CORPORATION

LIN Television Corporation ("LIN") responds to the FCC's National Broadband Plan Public Notice #26, released on December 2, 2009 ("*Public Notice #26*"), in these dockets.[1]

LIN is a local television and digital media company, operating 27 network-affiliated television stations in 17 midsized markets spread across the country. LIN's highly-rated stations deliver superior local news and community information, along with top-rated sports and entertainment programming, to 9% of U.S. television homes. LIN is a leader in the convergence of local broadcast television and the Internet through its television station web sites and a growing number of local interactive initiatives.

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[1] *Public Notice, Data Sought on Uses of Spectrum, NBP Public Notice # 26,* GN Docket Nos. 09-47, 09-51 and 09-137, DA 09-2518 (rel. Dec. 2, 2009) ("*Public Notice*").

LIN has invested heavily to transition its stations to all-digital operations. LIN's stations provide high-definition primary channels, plus additional multicast streams (including local weather programming), and LIN is planning (and has budgeted for) deployment of mobile services using the new ATSC-M/H standard. LIN has been a leader in efforts to bring new levels of operating efficiency to television broadcasting and related digital content publishing. LIN operates two regional state of the art High Definition Technology Centers controlling automated master control switching, media and meta-data content transfer, on-air monitoring, transmitter monitoring and video content sharing among multiple television stations. The Technology Centers provide centralized programming ingest, traffic operations, non-news related promotions and central finance functions. LIN's Technology Centers also provide bi-directional media transfer capabilities for content distribution in connection with LIN's non-broadcast digital media initiatives, include distribution to "new media" and mobile devices. Efficiencies gained through consolidation of these "back office" operations allows LIN to continue to invest heavily in news, public affairs and local outreach in each of the markets it serves while expanding distribution of LIN-produced local content to non-broadcast platforms.

In the past, LIN has had significant wireless spectrum holdings. With this background, LIN's viewpoint may be uniquely relevant to the debate, and we hope the Broadband Task Force, the Commission, and other interested parties will find these comments to be a constructive addition to the dialogue.

Preliminary Statement

CTIA, the trade association organized to serve the interests of subscription wireless service providers warns of a "looming national spectrum crisis."[2] CTIA has argued that spectrum assigned to and used by America's television broadcasters is "wasted" and the Consumer Electronics Association ("CEA") has submitted a paper by Coleman Bazelon arguing that substantial economic benefits would accrue if all of the country's television stations would simply sign off and try to make a business as local cable programmers.[3]

The FCC's Broadband Task Force appears to have accepted the CTIA's warning and appears to be entertaining recommendations consistent with the proposals of CTIA and CEA. It has concluded that the United States will not have enough spectrum available for wireless broadband services in the not-too-distant future.[4] FCC Chairman Genachowski has said that if we do not start the spectrum reallocation process now, "we'll pay a steep price in innovation down the road."[5] *Public Notice #26* poses questions that attempt to compare the economic value of television broadcasting with the economic value of wireless broadband.

On December 16, 2009 LIN submitted a written *ex parte* presentation in these dockets raising two points that LIN believes should guide the Broadband Task Force's review of comments submitted in response to *Public Notice #26*.[6] First, LIN observed that the basic premise of *Public Notice #26*, that the U.S. faces a severe nationwide shortage of spectrum from

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[2] *See, e.g.*, Testimony of CTIA-The Wireless Association President and CEO Steve Largent Regarding the Radio Spectrum Inventory Act (H.R. 3125), and the Spectrum Relocation Improvement Act (H.R. 3019) before the House Subcommittee on Communications, Technology, and the Internet (December 15, 2009).

[3] See *Comments of the Consumer Electronics Association*, GN Dockets 09-47, 09-51 and 09-137 (submitted October 23, 2009).

[4] *See* FCC News Release, "Options for a National Broadband Plan" (rel. December 16, 2009).

[5] Remarks of Chairman Julius Genachowski, Federal Communications Commission, "Innovation in a Broadband World," The Innovation Economy Conference, December 1, 2009.

[6] *See* Written *ex parte* communication of LIN Television Corporation, from John Hane and Rebecca Duke to Chairman Julius Genachowski, *et al.*, GN Docket Nos. 09-47, 09-51, 09-137, December 16, 2009.

wireless broadband, has no foundation in the record. LIN believes *Public Notice #26* should have at least acknowledged that the need for additional spectrum has been disputed, and LIN urges the Broadband Task Force to reconsider that position when drafting the National Broadband Plan. If the National Broadband Plan does project a shortage of spectrum for wireless broadband, it should acknowledge that several parties have challenged that conclusion.

Second, LIN observed that hastily prepared responses to *Public Notice #26* will provide an unstable foundation for policy recommendations regarding the costs and benefits of reallocation of the television broadcast spectrum. Questions about wireless broadband markets, technology and spectrum capacity have been a core aspect of this proceeding since the release of the original Notice of Inquiry more than ten months ago. After multiple rounds of comments and many workshops the record still does not contain clear and complete answers to these questions. It would be unrealistic for the Broadband Task Force or the Commission to expect television broadcasters to answer fully in nineteen days the sort of questions the wireless industry has been unable to answer about its own operations in more than ten months.

The National Broadband Plan should be based only on the information that is in the record and available to the public, and it should reflect a fair reading of that record. If the Broadband Task Force, the FCC staff, or any outside contractors have prepared analyses that the Broadband Task Force will rely upon in the National Broadband Plan, that information should be placed into the record promptly. If the National Broadband Plan proposes broadcast spectrum reallocation as a policy option, it should conspicuously state that the option was first considered late in the process and that broadcasters were given little time to respond to sweeping questions on a wide range of topics.

As requested, these comments adhere to the organization and structure of the questions in *Public Notice #26*.

Responses

A.1. What factors should the Commission consider when examining and comparing the benefits of spectrum used for over-the-air television broadcasting and those of spectrum used for wireless broadband services?

LIN takes this question to ask more about basic value judgments than about technical characteristics, because it does not distinguish among the various broadband services that are provided, in part, via spectrum resources.[7] Table A.1. (attached) highlights some of the differences between television broadcasting and some common wireless broadband services.

Comparisons between broadcast and wireless services are difficult and mostly subjective, because broadcast and wireless exploit spectrum resources in entirely different ways and they provide entirely different services. License holders use spectrum as a critical input to a variety of service offerings, each of which reflects, to a greater or lesser degree, the conditions the FCC attaches to the licenses and the markets in which the service providers compete. While most spectrum users exploit spectrum for its own sake, simply to transport information from place to place on behalf of paying customers, broadcasting has evolved as a hybrid service, providing both content and transport free to end users. Broadcasters are free publishers that use spectrum essentially as newsprint. Mobile service providers are basically paid couriers. Each is important, but they are difficult to compare.

[7] LIN is not aware of any broadband services that are provided entirely with spectrum resources. Spectrum is generally used to close gaps between access devices and the network, or between network interconnection points where wireline (including fiber) links are impractical. The job of "wireless broadband" spectrum is to get broadband data back to the wired network as efficiently as possible. It is possible to use spectrum for wireless broadband services in ways that are inherently inefficient by, for example, sending it to a distant base station rather than a nearby one or by coding it for mobile access when the user is stationary.

Nonetheless, *Public Notice #26* asks what factors the Commission should consider when comparing the benefits of spectrum used for over-the-air television broadcasting and those of spectrum used for wireless broadband services. LIN believes that the FCC itself defined most of those considerations when it chose to regulate broadcasting heavily and to regulate wireless services lightly. In the television broadcast service, the FCC values, for example, (i) relatively small enterprises using a relatively small amount of spectrum in each area, as reflected in ownership limits; (ii) a high degree of "localism" reflected in requirements for market presence and local outreach; (iii) political and civic engagement; (iv) programming that conforms to FCC and Congressionally imposed specifications; and (v) universal access through FCC-defined standards. Each of the myriad broadcast regulations reflects a value judgment made by Congress or the FCC. Obviously, all of these regulations restrict the ability of television broadcasters to respond to market demands. That is the nature of regulation.

In the commercial mobile wireless services, the FCC values, for example, (i) a mix of providers with national and regional scale; (ii) relatively large enterprises using large amounts of spectrum in each area, or in the case of national carriers, using large amounts of spectrum everywhere; (iii) highly flexible deployment and use of spectrum; and (iv) minimum coverage of licensed service areas. Regulation of commercial wireless carriers' use of spectrum is minimal compared to the pervasive regulation the FCC imposes on television broadcasters.

Beyond FCC regulations, there is little to distinguish the ability of a broadcast service provider and a wireless service provider to deploy new technologies or adopt new business models to meet changing public demands and expectations. In the case of both broadcast and wireless, private capital funds business enterprises, which deploy that capital to exploit spectrum resources to the full extent permitted by the FCC. The basic rules of capital markets and the

basic rules of business competition and market adaptation are the same for broadcasters as for Silicon Valley startups or international conglomerates. Broadcasters also have access to the same technologies and professional resources that are available to wireless service providers and other business segments. Differences in what some may perceive to be "efficient" use of spectrum and other resources arise exclusively from value judgments meted out in the FCC's disparate regulatory regimes.

As discussed below in response to Questions B.3. and B.4., LIN believes it is appropriate for the FCC to review some of the values it has established for the television broadcast business, because those value judgments, and the regulations that enforce those judgments, may be counterproductive in the context of today's environment of rapidly improving technology and fiercely competitive electronic media landscape.

A.2. What would be the impact to the U.S. economy if insufficient additional spectrum were made available for wireless broadband deployment, in terms of investments, jobs, consumer welfare, innovation, and other indicators of global leadership?

If a shortage of wireless broadband spectrum were to emerge, the economic impact would be directly related to the scope and severity of the shortage as well as the ability of the affected parties and advancing technology to mitigate the shortage. A slight shortage in a limited area that is mitigated through more capital, better technology or more efficient use of resources would have little or no impact. A substantial real shortage across the country that is not mitigated could have greater consequences. However, it would be wrong to conclude that a shortage would necessarily have *adverse* effects. A perceived shortage could trigger innovation and investment that results in significant net economic growth and continued international leadership. As explained below, the U.S. already has vastly more spectrum allocated to wireless, based on population density, than every other top ten Organization for Economic Co-Operation and

Development ("OECD") country except Canada. Carriers in more densely populated OECD countries serve relatively more people with relatively less spectrum than U.S. carriers, suggesting investment and innovation that eclipses levels seen in the U.S.

As LIN has previously written, there is no basis in the record on which the Broadband Task Force could reasonably conclude that the country faces a significant shortage of spectrum for mobile broadband. We do not here attempt to prove that there will never be any wireless broadband congestion anywhere in the United States resulting from too little spectrum in the hands of commercial mobile wireless service providers. Instead, we will identify what those warning of a looming national spectrum crisis should reasonably be expected to show. Reallocation advocates should be required to provide real-world data and be far more granular in describing the claimed spectrum shortage; they should be candid in their presentation and use of statistics; and they should justify aspects of their proposal that appear to result in highly inefficient uses of spectrum.

Specificity. First, those warning of a crisis should be much more precise about when and where a shortage may occur and how acute it may be. No one could convincingly argue that demand for wireless spectrum is evenly distributed throughout the country, whether measured geographically or by population covered. The wildly disparate per-pop winning bids in the recent Auction # 73 (700 MHz) show how much the supply/demand ratio varies from place to place. The per-pop prices paid were much higher in the most densely populated areas, suggesting both more demand there, and perhaps a higher cost of infrastructure as compared to spectrum, for incremental capacity gains. Looking objectively at the Auction # 73 results, one would be very unlikely to think that any future spectrum shortage would arise as a "national crisis," occurring suddenly and everywhere at roughly the same time.

CTIA has been vague about the timing of the crisis it predicts, but it has repeatedly portrayed the supposed shortage as imminent in time and catastrophic in scope. If a shortage arises at all, it will not occur suddenly in widespread and unpredictable places. Any spectrum shortage would be easily projected with great specificity and would be felt first in the most densely populated, highly "connected" central metropolitan area or areas. Thus, if the FCC were to make a prospective national allocation of spectrum sufficient to resolve a potential shortage in a few small geographic areas at some time in the future, most of the rest of the country would be vastly oversupplied with spectrum. It is extremely unlikely that a shortage of spectrum in less densely populated areas would ever occur.

This is one of the principle logical flaws of the "national spectrum crisis" in the reallocation proponent's claims. If there ever is an actual shortfall, it will only affect small geographic areas, and those areas will be the most heavily provisioned with alternative broadband infrastructure – fiber, copper, fixed wireless, unlicensed wireless and nomadic wireless access – in the entire country. If western New York State or coastal Carolina really needs at least another 800 MHz of spectrum in the not-too-distant future, that demand is invisible in the Auction # 73 results.

Of course, if a full and fair consideration of evidence suggests that more wireless spectrum will eventually be needed in certain densely populated metropolitan areas, the FCC will need to find a way to close the gap. The point is not for LIN to predict where and when more spectrum may be productively used for mobile broadband services. The point is that those who insist a spectrum crisis dire enough to affect America's global competitiveness is just around the corner need to provide far more granular facts and much more rigorous logic to support their case. The four national U.S. wireless carriers alone collected more than $34 billion in revenue in

the fourth quarter of 2008, reflecting an annualized rate of more than $130 billion.[8] CTIA members have access to rich troves of mobile traffic data; they have years of practical experience managing network load; they have sophisticated models that guide their auction bids; they know how much incremental income consumers can spend on mobile data; they know how much capital is required to construct additional capacity (with or without additional spectrum); they know that much traffic can be handed off to Wi-Fi access points or femtocells; and they know how much time they will need, at any given price point, to earn a fair return on their investment. They also know where demand is likely to peak, and when, and for what portion of each day, under a wide range of variable assumptions. Given what is allegedly at stake – a trillion dollars according to CEA[9] and America's global competitiveness according to CTIA,[10] it is a trivial matter for the proponents to give the public the information it needs to make an informed decision.

Notably, one of the four national wireless carriers has emphasized that demand is not uniform and has questioned whether a national reallocation is appropriate. In its comments responding to NBP Public Notice # 6, Sprint Nextel wrote:

> If all existing licensed spectrum were deployed, the demand created by new wireless broadband capabilities would generally create greater capacity shortages in the denser, urban markets compared to sparsely-populated rural markets. Thus, when parties suggest that the Commission should allocate a certain additional amount of spectrum nationally for a given service, the Commission should ask whether the same amount of spectrum is required in Missoula, Montana as in New York, New York. Before

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[8] See, Wireless Scorecard, Recession Edition, by Stacy Higgenbotham, GigaOM.com, February 27, 2009 (available at http://gigaom.com/2009/02/27/wireless-scorecard-recession-edition(visited December 20, 2009).

[9] CEA has submitted into the record a study by economist Coleman Bazelon projecting that the "consumer surplus" from a wholesale reallocation of the television broadcast spectrum for mobile broadband would approach $1 trillion. Bazelon Study at 2. Mr. Bazelon asserts that the total market value of all full power broadcast spectrum alone could be as much as $62 billion. Bazelon Study at 13.

[10] See, e.g., *CTIA ex parte* at 1, 3.

> reallocating spectrum on a nationwide basis, the Commission's analysis should be geographically granular.[11]

Candor. Second, those asserting that a spectrum crisis looms should be candid in the statistics they cite and the arguments they make. Aspects of the case urged by CTIA so far simply are not candid. For example, on September 29, 2009 CTIA submitted a written *ex parte* presentation in which it argued that because "56% of Americans have accessed the Internet by wireless means"[12] the FCC should allocate "at least another 800 MHz" for licensed mobile broadband service.[13] CTIA's source is a Pew study[14] in which "wireless" refers to all forms of wireless access, including unlicensed Wi-Fi access at home. CTIA is using free, unlicensed Wi-Fi traffic statistics to support its argument that wireless carriers are running out of spectrum for mobile broadband.

CTIA has also made a number of misleading arguments about the supply of spectrum in the United States compared to the supply in other developed countries. For example, CTIA has prepared a table (based only on "CTIA Estimates") that shows the U.S. "lagging" other top-ten (by GDP) OECD countries with respect to "spectrum in the pipeline." For convenience, the chart included in CTIA's filing is reproduced here:

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[11] Comments of Sprint Nextel Corporation – NBP Public Notice #6, GN Dockets 09-47, 09-51 and 09-137, submitted October 23, 2009, at 25 ("*Sprint Nextel Comments*").

[12] Written Ex Parte Communication of CTIA, GN Docket No. 09-51, September 29, 2009 at 2 ("*CTIA ex parte*").

[13] *Id.* at 1, 2.

[14] *Wireless Internet Use*, Pew Internet & American Life Project, at 3 (July 2009) ("*2009 Pew Wireless Internet Use*").

Spectrum Pipeline – International Comparison

CTIA
The Wireless Association®

	USA	Japan	Germany	U.K.	France	Italy	Canada	Spain	S. Korea	Mexico
Subscribers**	270.3m	110.6m	107.0m	76.8m	57.5m	89.9m	21.7m	53.1m	46.2m	79.4m
Average Consumers' Minutes of Use per Month**	830	134	102	193	251	128	420	149	306	170
Average Revenue per Minute – A Measure of the Effective Price per Voice Minute**	$0.05	$0.25	$0.15	$0.10	$0.14	$0.15	$0.08	$0.19	$0.07	$0.06
Efficient Use of Spectrum -- Subscribers Served per MHz of Spectrum Allocated	660,073	314,985	350,819	217,687	153,497	288,696	105,853	148,324	198,283	661,666
Spectrum Assigned for Commercial Wireless Use	409.5 MHz*	347 MHz	305 MHz	352.8 MHz	374.6 MHz	311.4 MHz	205 MHz	358 MHz	233 MHz	120 MHz
Potentially Usable Spectrum/In the Pipeline***	50 MHz	165 MHz	340 MHz	355 MHz	72 MHz	254 MHz				120 MHz

*Figure includes AWS-1, 700 MHz spectrum not yet in use and 55.5 MHz of spectrum at 2.5 GHz.
** Glen Campbell, et al., "Global Wireless Matrix 1Q09," Merrill Lynch, June 25, 2009, at Table 1.
***Complete information on "pipeline" spectrum was not available for all countries at the time of filing/publication.

Source: CTIA estimates.

CTIA relies on these estimates to argue that U.S. carriers are the most "efficient" in the world, because they serve more subscribers per allocated MHz than other top ten OECD nations. The problem with that logic is that demand for more MHz of allocated spectrum is highly correlated to population density. Because wireless spectrum can be re-used in relatively small areas, a single 5 MHz spectrum assignment can serve far more people if the people are spread across a larger area. Just as carriers need more MHz of spectrum to serve 100,000 subscribers in Manhattan than they do to serve 100,000 subscribers in Iowa, carriers in densely populated

countries need more spectrum than carriers in the United States to provide equivalent service levels.

The table below uses CTIA's estimates of subscribers and allocated spectrum, but adds a critical missing element -- population density – to provide a better picture of how efficiently different countries use wireless spectrum.

SPECTRUM EFFICIENCY - INTERNATIONAL COMPARISON

	USA	Japan	Germany	UK	France	Italy	Canada	Spain	S. Korea	Mexico
Subscribers (millions)*	270.3	110.6	107	76.8	57.5	89.9	21.7	53.1	46.2	79.4
Efficient Use of Spectrum-Subscribers Served per MHz of Spectrum Allocated (CTIA Mesaure)*	660,073	314,985	350,819	217,687	153,497	288,696	105,853	148,324	198,283	661,666
Spectrum Assigned for Commercial Wireless Use*	409.5	347	305	352.8	374.6	311.4	205	358	233	120
Potentially Useable Spectrum in the Pipeline*	50	165	340	355	72	254				120
Population Density**	33.5	339.1	235.8	253.0	100.1	197.7	3.7	81.1	494.0	57.8
MHz/population density (assigned)	12.2	1.0	1.3	1.4	3.7	1.6	55.7	4.4	0.5	2.1
MHz/population density (assigned+pipeline)	13.7	1.5	2.7	2.8	4.5	2.9	55.7	4.4	0.5	4.2
Efficiency Rank	**9**	**2**	**3**	**4**	**8**	**5**	**10**	**7**	**1**	**6**

*Source: CTIA ex parte **Source: CIA World Factbook 2009

Viewed from a more accurate perspective, spectrum assignments divided by population density, U.S. carriers are almost the *least* efficient users of spectrum among top ten OECD countries. If CTIA's estimates are correct, Japan's carriers manage to serve more than 110 million subscribers at a population density of 339/sq. km² with just 347 MHz of spectrum, while U.S. carriers use 409 MHz to serve 270 million subscribers at a population density less than a tenth of Japan's. When compared based on population density, U.S. carriers already have twelve times as much licensed spectrum as Japan's carriers. Before they can justify the most fundamental shift in spectrum policy in U.S. history, CTIA and others calling for reallocation of

television broadcast spectrum for commercial wireless services owe Americans substantially more candor about how they expect to use and deploy our valuable national resources.

Inefficiency. In view of the rich spectrum assignments U.S. carriers already have relative to other developed nations, those arguing that the U.S. faces a severe wireless spectrum shortfall should be much more specific about the types of traffic they expect to carry, the usage patterns they intend to encourage users to adopt, and the types of network topologies and technologies that may be available to address growing demand even if more spectrum is not allocated. If the underlying policy goal of this inquiry is to determine what use of the spectrum is most efficient, the record should consider how the wireless carriers propose to use any new spectrum assignments and whether those planned uses are efficient. The record contains almost no information on this critical topic, but there are indications that the wireless carriers intend to deploy new spectrum in ways that are not necessarily efficient.

-*Nomadic vs. mobile.* One of the problems with relying on statistics to guide policy decisions about mobile broadband is that there are no generally accepted definitions for various terms.[15] As we have seen with CTIA's decision to use Wi-Fi access statistics to support its argument that licensed wireless carriers are running out of spectrum, this lack of a clear vocabulary means that few statistics about wireless broadband can be taken at face value, and that comparisons between statistics gathered for different purposes in different places and at different times can be especially misleading.

One especially important factor missing from the public dialogue surrounding the National Broadband Plan is the distinction between "nomadic" wireless and "mobile" wireless.

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[15] See, e.g., *OCED Working Party on Communication Infrastructures and Services Policy, Mobile Broadband: Pricing and Services*, DSTI/ICCP/CISP(2008)6/FINAL (30 June 2009) (available at http://www.oecd.org/dataoecd/26/19/43280727.pdf) ("[A]nalysis of mobile broadband requires a definition which is widely adopted – such a definition is not yet available although work is underway in this area.")

There is room for disagreement on these terms, but in general, "nomadic" wireless refers to usage in which the user may move from place to place but is more or less stationary when connected.[16] Wi-Fi access points, in the home or office or in Wi-Fi "hot spots" are a common form of nomadic access. Femtocells provide another form of nomadic access. "Mobile" wireless in its narrow sense refers to access that is available when the user is actually moving, although it is common for a reference to "mobile" broadband to be addressing both mobile and nomadic uses. "Broadband wireless access" is a larger category that includes all mobile, nomadic and fixed services delivered wirelessly.[17]

While mobile and nomadic services are not the same thing, in many or most cases they can be used interchangeably. In a recent Progress and Freedom Foundation seminar on the question of broadcast spectrum reallocation, Kostas Liopiros, Principal, The Sun Fire Group, observed that for many uses mobile is "overkill" because "you don't need mobility in many cases" and the extra coding to enable mobility "comes at a price in terms of use of spectrum."[18] Mr. Liopiros noted that other countries are placing a greater focus on supporting appropriate traffic with nomadic links rather than mobile links, which does not require the "large overhead and coding required" to support mobility. Mr. Liopiros notes that the nomadic versus mobile distinction is part of the Long Term Evolution ("LTE") standard, and that the concept is for the nomadic component "which might be in hot spots, for example, railroad stations and the home,

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[16] *See, e.g., Request for Input on Broadband Wireless Access Standards on the Mobile Service*, ITU Radiocommunications Study Group Working Party 8A, Document 8F/651-E at 2 ("*WP 8A Request*").

[17] *See, e.g., WP 8A Request* at 2.

[18] Transcript of Progress and Freedom Foundation's *Let's Make a Deal: Broadcasters, Mobile Broadband, and a Market in Spectrum: Moderated Panel Discussion*, December 1, 2009 at p. 40 (available at http://pff.org/events/pastevents/120109-broadcasters-mobile-broadband-spectrum-market.asp).

other areas, to work in concert with the mobile capability used where demand is higher to support some of the kinds of [bandwidth intensive] applications you are talking about."[19]

It is possible that efforts in other countries to support traffic with nomadic links when appropriate is one of the reasons they are able to support much higher density populations with far less bandwidth, relatively speaking, than U.S. carriers are able to support. There is evidence that U.S. carriers are beginning to embrace nomadic links as traffic management tools, though. Apple's iPhone includes Wi-Fi capability,[20] and Verizon Wireless recently added free "hotspot" roaming access to its mobile data plans.[21] T-Mobile offers a service that allows users to use home Wi-Fi or T-Mobile Wi-Fi hotspot links for voice calls, reducing network congestion.[22] As Peter Rysavy of Rysavy Research recently observed, "letting 3G subscribers use hotspots free isn't benevolence; operators are trying to off-load as much data as they can onto Wi-Fi."[23]

As Mr. Liopiros' comments indicate, when a user has a nomadic link available but uses a mobile link anyway, the spectrum usage is not efficient, because increased coding for mobility reduces the amount of traffic that can be carried on a given unit of spectrum. Moreover, mobile wireless links are typically much longer than nomadic links, meaning more spectrum must be used to get data from the user's device to the wired network (where almost all wireless data is ultimately bound). Although CTIA and others have provided substantial data showing that demand for wireless broadband is rising, much of that data does not distinguish between nomadic and mobile broadband. The parties urging the FCC to reallocate broadcast spectrum

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[19] *Id.*

[20] *See* http://en.wikipedia.org/wiki/iPhone.

[21] See Verizon Wireless press release, *Verizon Wi-Fi Gives Mobile Broadband Customers More Ways to Connect to* the Internet, December 15, 2009 (available at http://www.prnewswire.com/news-releases/verizon-wi-fi-gives-mobile-broadband-customers-more-ways-to-connect-to-the-internet-79300242.html) (visited December 21, 2009).

[22] *See* http://bit.ly/T-Mobile_Home (visited December 21, 2009)

[23] *Spectrum Crisis*, Information Week, October 26, 2009 at 23, 24-26 (available at http://rysavy.com/Articles/2009_10_Spectrum_Crisis.pdf).

should be very specific about how much spectrum is actually needed for licensed mobile wireless broadband, and how basic tools such as integration of nomadic access can dramatically relieve mobile wireless traffic demand and provide a far more efficient use spectrum resources.

-*Fixed-mobile substitution.* Another of the drivers of CTIA's projected mobile broadband growth is not mobile traffic at all – it is a phenomenon CTIA calls "fixed-mobile substitution."[24] Fixed-mobile substitution occurs when a consumer drops a copper or fiber broadband connection at home and simply uses his or her mobile broadband connection all of the time. Although this may be a substantial driver of mobile broadband data traffic, it is not clear that Federal policy should promote such a trend or that doing so would represent a judicious use of spectrum.

Fixed-mobile substitution may be a good way for CTIA members to expand their market share, but that expansion would come at a substantial cost to the public. Fixed-mobile substitution has several deleterious effects, including slower in-home access speeds (because mobile links are typically slower than average copper or fiber links); higher costs; waste of Wi-Fi spectrum (users without home broadband connections are less likely to deploy Wi-Fi links); dilution of demand for (and therefore less investment in and deployment of) ultra high bandwidth links to the home; and inefficient use of licensed spectrum. When consumers or businesses access mobile base stations in what would properly be considered a nomadic use case (for example, where Wi-Fi coverage exists), the extra coding and extra distance bits must travel constitute an enormous waste of spectrum.

CTIA's vague and generalized projections of "exploding" demand for mobile broadband spectrum rely in part on the idea that wireless carriers will encourage consumers to drop their

[24] CTIA *ex parte* at 12.

home broadband connections and use mobile connections exclusively, even when they are at home. The Broadband Task Force should consider whether this is a policy the FCC wants to endorse.

-*New Network Topologies and Technologies.* Those urging reallocation of broadcast spectrum for mobile broadband services have been vague about the degree to which new technologies and better deployment of infrastructure can provide new capacity without additional spectrum assignments. CTIA bases its arguments mostly on the paper by Rysavy Research titled *Mobile Broadband Spectrum Demand.*[25] The Rysavy Paper acknowledges that "increasing the number of cell sites can also dramatically increase overall network capacity and has been the tool operators have used most frequently to expand capacity since the inception of cellular networks."[26] Rysavy continues,

> The whole basis of cellular is to efficiently reuse spectrum and the smaller the cell, the greater the capacity per unit area (e.g., today's cell sites are easily one tenth the diameter of early sites). Operators will certainly increase the number of cell sites they deploy but, as with increasing spectral efficiency, so too there are practical limits to what can be accomplished by adding cell sites. Operators are also deploying pico cells to augment coverage, but this only addresses coverage and capacity for very localized areas.
>
> So, while greater spectral efficiency and more cell sites are critically important, they are unlikely to be able to address increasing capacity demand alone. Long term . . . it will require a combination of these methods and the addition of spectrum in order for operators to grow their networks and stay ahead of consumer demand.[27]

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[25] The Rysavy paper, *Mobile Broadband Spectrum Demand*, is appended to CTIA's *ex parte* filed in these dockets on September 29, 2009 ("*Rysavy Paper*").

[26] *Id.* at 19.

[27] *Id.* at 19-20.

This is actually the full extent of CTIA and Rysavy's analysis of the potential for better topologies to meet growing demand. The statement is conclusory and should not serve to guide national spectrum policy.

Spectrum should not be reallocated to commercial wireless operators who would use it inefficiently. Sprint Nextel has urged the Commission to give close attention to improvements in technology as well as better network topologies when assessing the need for more wireless broadband spectrum.[28] Sprint Nextel cites new wireless interfaces, improved antenna technology, and femtocells (which permit very dense frequency reuse and allow wireless traffic to be offloaded onto localized access points) as factors the FCC should consider when calculating spectrum needs. Sprint Nextel states that these technologies "will result in dramatic improvements to spectral efficiency and network capacity" and notes that "[e]stimates based only on the growth in demand for wireless services – and based on calculations using today's technologies – are likely overestimating the amount of new spectrum that should be allocated for commercial wireless service."[29] LIN agrees, and urges the Broadband Task Force to fully address this issue in any recommendation it makes in the National Broadband Plan.

A.5(a). How do broadcasters plan to use licensed spectrum in the future? What innovations in applications, services, or business models will create synergies between broadband and broadcast services, or other new value from currently licensed spectrum?

Please see the response to questions B.3. and B.4. below.

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[28] *Sprint Nextel Comments* at 23.

[29] *Id.* at 24-25.

B.1. What are the advantages of a channel-sharing approach to broadcasters' business? What are the disadvantages of this approach? What are the technical and business requirements to enable successful channel sharing?

Channel sharing is not a realistic option under the FCC's existing television broadcast regulatory regime, because the net effect would be to reduce the scale of a business that is already kept far too small by FCC regulations. LIN's responses to Questions B.3 and B.4. below address the problems that have developed as a result of government limits on the scale any particular television broadcast enterprise is permitted to achieve.

B.2. What opportunities exist to free up broadcast spectrum through greater collocation of transmission facilities closer to the center of densely populated areas? There are numerous examples of broadcasters collocating facilities already. What are the financial and other benefits of collocation? What are the tradeoffs for broadcast TV stations and consumers in terms of signal coverage and local programming efforts?

In theory, it might be possible to "free up" some spectrum in certain geographic areas through greater collocation of broadcast transmission facilities with sufficient time, resources and cooperation among broadcasters, tower companies, zoning officials, insurance carriers, politicians and citizens. However, broadcasters already have substantial economic, technical and practical incentives to collocate, so the degree of collocation that exists today probably reflects, in the aggregate, the most efficient collocation factor that is achievable in a practical and economically sensible way. It is unlikely that collocation, which must be achieved on a market-by-market basis, could free up enough spectrum to support an additional national wireless service allocation. Moreover, because the "preclusion zones" created by broadcast stations do not map to traditional wireless service area license boundaries, it is unlikely that a significant amount of spectrum could be cleared through collocation to permit additional regional wireless service licenses.

B.3. How will video capabilities improve over time using current MPEG-2 and 8-VSB technologies? What improvements could be gained by deployment of next generation technologies over that currently achieved under the ATSC standard? What would be required for broadcasters and consumers to transition to more advanced technologies?

B.4. To what extent would establishing antenna and receiver standards facilitate spectral efficiency and improved reception in broadcasting? What other actions could the FCC take to enable broadcasters to make more efficient use of their spectrum?

These questions ask how new technologies might be integrated into the television broadcast infrastructure in order to improve the broadcast service offering, and how the FCC can facilitate the evolution of the television broadcast service for more efficient use of spectrum. LIN believes that many of the answers lie in the regulatory approach the FCC has applied, with great success, to commercial mobile wireless services.

There are three principal areas in which the FCC regulates broadcasting: (i) service-specific rules relating to content, local outreach and civic involvement; (ii) highly restrictive spectrum caps, in the form of rules that restrict ownership and control; and (iii) rules that specify fairly rigid technical parameters for operations. The latter two categories do nothing to define the broadcasting service; they simply limit the scale and technical flexibility of companies that choose to provide broadcasting service. These limits on scale and technical flexibility impose costly burdens on broadcasters as they adapt to the competitive reality of the twenty-first century electronic communications marketplace, and they have greatly slowed the pace of evolution of broadcast technology and services. Consumers ultimately pay these costs in one form or another, and consumers lose when technology evolves more slowly than it otherwise could.

Broadcasting remains an inherently local service, but the technology that delivers the service and the capital markets that finance the business are not local, regional or even national. As *Public Notice #26* recognizes, our communications services must be globally competitive,

and it is impossible to be globally competitive at an artificially limited scale using only government-approved technologies and service architectures. Yet, this is precisely the situation in which ownership and technical regulations have placed the television broadcasting industry. Being competitive in the communications marketplace in 2010 and beyond means having enough scale to influence the design, cost and features of consumer devices. It means having the ability to launch new services using new technologies, continuously, without disenfranchising users of existing services. It means having enough scale to address a national market, or to provide a game-changing service in a local market. These options – almost universally understood to be essential elements for competitive mobile services – are not available to any U.S. broadcaster.

The FCC has licensed four mobile wireless service providers to cover essentially all of the country, and it has licensed dozens of other regional service providers. All have larger spectrum allocations than any broadcaster. In most markets, a company providing free over-the-air broadcast service is subject to a 6 MHz spectrum cap, and no broadcaster is permitted to own stations in every market. Every broadcaster must use, exclusively, a broadcast technology selected by the FCC. In contrast, Verizon Wireless, for example, holds wireless licenses covering essentially the entire country, including all of the top 100 markets. It holds licenses for dozens of megahertz in every market it serves, and has well over 120 megahertz in many markets – at least twenty times more than a broadcaster serving the same markets would be permitted to hold. With this much spectrum, Verizon Wireless can, and does, provide service to multiple generations of devices without ever disenfranchising consumers. It can deploy new technology and phase out old technology without seeking new FCC technical standards or requesting a government-managed transition.

Of course, broadcasting does not operate on the same business model that mobile wireless services have adopted, but the requirements of scale for innovation and service evolution are the same. Wireless carriers typically subsidize consumer equipment and have great control over how those devices operate and what features and services they provide. Carriers also have the ability to render old technology obsolete by ceasing to operate with old, inefficient standards. In contrast, consumers expect that their televisions will operate indefinitely, and broadcasters have little control over what kinds of sets and features are available to consumers. Broadcasters must continue to provide ATSC-based digital broadcasts indefinitely.

On the other hand, consumers increasingly are accessing video content on devices that would not normally be considered a "television." With sufficient spectrum in each market and increased technical flexibility, broadcasters could choose to continue providing ATSC services while simultaneously deploying other technologies to provide greater access to their content. For example, the LTE standard includes a "Multicast Broadcast Single Frequency Network" ("MBSFN"). MBSFN is essentially a broadcast standard, and shows that LTE's developers recognize that a broadcast architecture is a more efficient way to distribute certain types of content. The FCC should encourage broadcasters to extend their traditional local service-oriented business model to new technologies, and it should provide broadcasters with the ability to aggregate enough spectrum to do so. Carriers that have been resistant to incorporating ATSC mobile capability into their devices may be more receptive if broadcasters could also use a technology that their devices already incorporate. Similarly, if a single broadcaster could provide more services in a market, or could commit to providing a consistent service regionally or nationally, wireless carriers may be more receptive to permitting their subscribers to access free television. LIN's Technology Centers are designed to support a range of digital content

services across a variety of platforms, and if LIN could acquire more television stations in a particular market, it could leverage those capabilities far more efficiently and provide more services to local markets. Regulations that keep broadcasters relatively small and restrict their technology choices impose great costs, some of which are not necessarily obvious.

The FCC's ownership rules have balkanized television broadcasting; indeed, that was their intent. However effective those rules might have been decades ago when competition was limited and innovation was rare, they are profoundly counterproductive today, when competition is fierce and innovation is expected. The best way for the FCC to help broadcasters transition to new technologies and use spectrum more efficiently is to lift unnecessary regulations.

Broadcasters, regulators, public interest groups and others are unlikely ever to agree, even among their own kind, on the appropriate scope of broadcast service-specific public interest obligations, such as localism, programming guidelines and limits, public affairs, and other matters. LIN's comments here do not address one way or another the appropriate scope of such regulations, and LIN acknowledges that broadcasters hold unique public interest obligations that are an inherent feature of the broadcast service. LIN's comments address the specific questions asked in *Public Notice #26* about what conditions are needed for broadcasters to adopt new technologies and use spectrum more efficiently. Substantial relaxation of the broadcast spectrum caps – the ownership rules – and greater technical flexibility are necessary conditions for these gains, but LIN believes they are also sufficient conditions. Deregulation in these areas will lead directly and quickly to substantial gains in the quality, amount and accessibility of free television broadcast services for the American public.

D. What market-based or other incentive mechanisms should the Commission consider to enable broadcasters to choose whether or not to make any spectrum (excess or otherwise) available for reallocation to wireless broadband use?

Please see LIN's response to Questions B.3 and B.4. above. The best market-based incentives would arise from elimination of regulations that prohibit market efficiencies from being realized.

Respectfully submitted,

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Table A.1.

Wireless broadband service	Comparison to Broadcast
Licensed fixed wireless backhaul (LFWB)	**Technical:** higher level of theoretical frequency re-use than broadcast; easier to coordinate non-conforming uses; high spectral density. **Financial:** high cost infrastructure; not an end-user service. **Features/value:** is point-to-point transport only; does not serve wide area; does not provide content; minimal economic/job impact; minimally regulated; inflexible – can only provide communications between fixed points; wireline (fiber or copper) equivalent substitutes sometimes available. **Regulatory:** minimal regulation compared to broadcast.
Licensed commercial wireless mobile	**Technical:** proprietary standards; requires heavy coding to support mobility (less spectrally efficient than fixed/nomadic links); in-vehicle and in-building coverage uneven outside of urban areas; cellular architecture is highly efficient for voice traffic, highly inefficient for rich media delivery compared to broadcast. **Financial:** highest cost of all broadband; high margin business; high barriers to entry. **Features/value:** rapid device/feature innovation cycle; integrated service network; relatively few competing service providers per market (compared to broadcast); access links and value add services only (applications but minimal content; little or no local content). **Regulatory:** minimal regulation compared to broadcast; licensees permitted to hold 100 MHz or more in each market and nationwide.
Femtocells	**Technical:** proprietary standards; generally carrier-specific access; low-cost; extremely high levels of frequency re-use; capable of rapid and widespread “organic” growth; very low power compared to broadcast. **Financial:** cost of hardware and recurring service cost depends on carrier business approach (could

Wireless broadband service	Comparison to Broadcast
	subsidize equipment, charge premium for equipment, assess separate charge, or permit "free" access). **Features/value:** nomadic use case; potential for rapid device/feature innovation cycle. **Regulatory:** devices must comply with carrier license terms and be FCC certified; minimal regulation compared to broadcast.
Licensed wireless "noncommercial" mobile (dispatch, public safety)	**Technical:** proprietary standards; if digital, requires heavy coding to support mobility. **Financial:** expensive to construct and operate special purpose networks; specialized user devices also expensive; generally a cost center (not a revenue generating service). **Features/value:** Features depend on licensee and usage; high degree of flexibility to deploy network as needed by users. **Regulatory:** minimal regulation compared to broadcast.
Unlicensed noncommercial nomadic/mobile wireless (e.g. residential Wi-Fi)	**Technical:** Extremely high levels of frequency re-use; capable of rapid and widespread "organic" growth; contention access; market-based standards; globally harmonized bands/access technology; **Financial:** inexpensive hardware; no recurring service cost; enhances value of broadband to home/workplace. **Features/value:** simplifies device interoperability (network agnostic); can serve as LAN even without WAN connection; does not provide content; highly effective, low-cost option to offload traffic from licensed mobile networks (reduces capex for mobile broadband carriers); stimulates broadband adoption (rather than encouraging fix/mobile substitution); very low barriers to entry; no auction revenue for treasury; **Regulatory:** Users are essentially unregulated; compliant devices may be deployed and used without FCC involvement. Minimal regulation compared to broadcast.

Wireless broadband service	Comparison to Broadcast
Unlicensed commercial nomadic/mobile wireless (commercial Wi-Fi hotspots)	**Technical:** Extremely high levels of frequency re-use; capable of rapid and widespread "organic" growth; contention access; market-based standards; globally harmonized bands/access technology. **Financial:** inexpensive access point hardware; no recurring service cost; several service models (e.g. per month, per session, free, free with purchase). **Features/value:** Wi-Fi capability almost universal in mobile computers and other devices; does not provide content; highly effective, low-cost option to offload traffic from licensed mobile networks (reduces capex for mobile broadband carriers); very low barriers to entry; no auction revenue for treasury. **Regulatory:** Users are essentially unregulated; compliant devices may be deployed and used without FCC involvement. Minimal regulation compared to broadcast.