The Economic Benefits of Keeping the “E” in EBS

A Comparison of Licensing Unassigned EBS to Educators and Nonprofits, Versus Commercial Auctions

View the one-page summary
THE ECONOMIC BENEFITS OF KEEPING THE “E” IN EBS:
A COMPARISON OF LICENSING UNASSIGNED EBS
TO EDUCATORS AND NONPROFITS VS. COMMERCIAL AUCTIONS

Washington DC, May 15, 2019
APPROXIMATELY 4,000 EBS LICENSES, PRIMARILY IN RURAL PARTS OF THE COUNTRY, HAVE NEVER BEEN ASSIGNED

CURRENT EDUCATIONAL BROADBAND SERVICE LICENSES

Source: FCC Universal Licensing System Data
The FCC is considering various proposals for licensing the remaining 4,000 EBS licenses (“EBS white space”)

This study considers two proposals:

- A baseline proposal would assign the remaining licenses to educational organizations and/or tribal nations, as it was done before
- As an alternative, others propose that remaining EBS white space be auctioned to commercial providers while simultaneously eliminating all requirements that this spectrum is used for educational purposes

The FCC also recommends that current EBS licensees be allowed to sell their licenses to commercial operators

**KEY STUDY ISSUES**

- What is the economic and social value of extending the current EBS licensing regime to educational institutions/tribes?
- What comparable value would be generated if the licenses are auctioned to commercial operators instead?
THE STUDY IS BASED ON ESTIMATING SOCIO-ECONOMIC TRADE-OFFS OF ASSIGNING ~4,000 2.5 GHZ LICENSES THROUGH EITHER CURRENT EBS RULES OR AN Overlay AUCTION

---

**Existing EBS Licenses**
- ~2,280 licenses
- 50% of US territory
- 85% of population

**New EBS Licenses**
- ~4,000 licenses
- 50% of US territory
- 15% of population

---

**License to Educators Model**
- Economic benefit of reducing the population unserved by wireless broadband
- Economic benefit of new, affordable EBS broadband offers in areas already served by commercial operators
- Social benefit from the two effects above

**Auction Model**
- Overlay auction proceeds for 4,000 licenses
- Economic benefit based on commercial offers in new covered areas, considering ROI imperatives and timing as constraints of deployment
SIX SOURCES OF SOCIAL AND ECONOMIC VALUE TO BE ASSESSED

Current Situation

- Wireless broadband penetration: 85% (GSMA)
- 78 unserved counties and 141 partially served counties (Form 477)
- Rural county coverage: 50% (Opensignal)

- US GDP $ 19.39 trillion (World Bank)

- 5,013,242 children under 18 years old no broadband subscription (ACS 2017)
- 2,036,753 children under 18 reside in a household without a computer (ACS 2017)

- 7.4% high school dropout rate (National Center of Education Statistics)
- 70% of high school graduates apply to college but 1 in 5 quit (Dept. of Education)

- Most affordable LTE plan: $20(*) (3.5% of monthly income of first decile)
- Public libraries use 266 GB per month, interested in saving in data consumption

- The FCC collected $21.267 billion in 2017-18 spectrum auctions

Key question

- Which option more effectively reduces the digital divide?
- Which option generates the largest externalities impacting the GDP?
- Which option has the highest reduction of the homework gap?
- Which option has the highest impact on reduction of high school attrition?
- Which option increases wireless broadband affordability?
- What is the contribution to the Treasury of each option?

* Verizon Connected Device Ellipsis Hotspot service for US$ 20 monthly
ASSESSMENT OF ECONOMIC AND SOCIAL VALUE

- Reduction of the digital divide
  - Contribution to GDP
  - Reduction of the homework gap
  - Reduction of high school attrition
  - Economic surplus
  - Contribution to Treasury
REDUCTION OF THE DIGITAL DIVIDE: MODERNIZING THE EBS LICENSING MODEL COULD REDUCE THE DIGITAL DIVIDE BY ABOUT 18.28%

Population covered by one or more wireless networks

1. Population that will adopt high speed broadband as a result of affordable offers

2. Population that will adopt high speed broadband as a result of increased coverage and affordable offers

~ 4,000 EBS unassigned wireless licenses

11,478,000 non-adopting population (*)

5,783,000 unserved population

5,002,000 subscribers

Expected adoption: 58% (Pew Research)

3,354,000 subscribers

8,356,000 new subscribers (18.28% reduction of digital divide)

Price elasticity of a $10/month plan (**)

* 15,852,000 population already purchasing service. (***) PER SHLB proposal
REDUCTION OF THE DIGITAL DIVIDE:
AUCTIONING UNASSIGNED EBS YIELD ONLY A 1.49% DIGITAL DIVIDE REDUCTION

Population covered by one or more wireless networks

1. Population that will adopt high speed broadband as a result of increased coverage and affordable offers

2. Population that will adopt high speed broadband as a result of affordable offers

~ 4,000 EBS unassigned wireless licenses

11,478,000 non-adopting population (*)

Commercial operators do not need spectrum to offer affordable plans

0 subscribers

5,783,000 unserved population

24 out of 78 counties present a positive NPV of Wireless deployment

682,000 subscribers

682,000 new subscribers (1.49% reduction of digital divide)

(*) 15,852,000 population already purchasing service
ASSESSMENT OF ECONOMIC AND SOCIAL VALUE

- Reduction of the digital divide
- Contribution to GDP
- Reduction of the homework gap
- Reduction of high school attrition
- Economic surplus
- Contribution to Treasury
INCREASE IN GDP:
THE EBS LICENSING MODEL PRODUCES SIGNIFICANTLY GREATER IMPACT ON GDP

Keeping the current EBS license framework

Assigning licenses through an overlay auction

Additional subscribers / incremental penetration

8,356,000 (2.70%) → $70.93 billion

682,000 (0.22%) → $4.94 billion

An increase of 10 percent in penetration yields an increase in 0.1156% of the GDP (ITU model)

GDP five-year cumulative impact

$70.93 billion

$4.94 billion
Reduction of the digital divide

Contribution to GDP

- Reduction of the homework gap

- Reduction of high school attrition

- Economic surplus

- Contribution to Treasury
REDUCTION OF THE HOMEWORK GAP:
THE MODERNIZED EBS LICENSING MODEL COULD REDUCE THE RURAL HOMEWORK GAP BY ABOUT 29.6%

Homework Gap In Rural Areas with Unassigned EBS: 662,000

Population covered by one or more wireless networks

1. Children in households that will adopt high speed broadband as a result of affordable offers
   ~ 4,000 EBS unassigned wireless licenses

2. Children in households that will adopt high speed broadband as a result of increased coverage and affordable offers

87,450 children
85% of non adopters would acquire affordable plan of $10/month (*)
73,000 children

144,000 children
85% adoption of affordable plan of $10/month (*)
123,000 children

196,000 children (29.6% reduction of homework gap in rural areas)

(*) PER SHLB proposal
Homework Gap
In Rural Areas with Unassigned EBS: 662,000

Population covered by one or more wireless networks

1. Children in households that will adopt high speed broadband as a result of affordable offers
2. Children in households that will adopt high speed broadband as a result of increased coverage and affordable offers
~ 4,000 EBS unassigned wireless licenses

87,450 children

Sprint does not need additional spectrum to offer One Million plan in these areas

144,000 children

24 of 78 counties present a positive NPV of Wireless deployment enabling the offer of One Million

One Million restricted to high school students: 7,500 children

0 children

7,500 children (1.13% reduction of homework gap in rural areas)
ASSESSMENT OF ECONOMIC AND SOCIAL VALUE

- Reduction of the digital divide
- Contribution to GDP
- Reduction of the homework gap
- Reduction of high school attrition
- Economic surplus
- Contribution to Treasury
REDUCING HIGH SCHOOL ATTRITION: THE EBS LICENSING MODEL COULD INCREASE HIGH SCHOOL GRADUATION FOR 43,047 CHILDREN

Total K-12 children in rural counties: 4,415,000

Total high school dropout in rural counties: 326,700 (*)

Population covered by one or more wireless networks

1. Children in households that will adopt high speed broadband as a result of increased coverage and affordable offers
   ~ 4,000 EBS unassigned wireless licenses

2. Children in households that will adopt high speed broadband as a result of increased access

4,467,165 children
- 1.62% elasticity household penetration
- Children with access 6-8 percentage points more likely to graduate (Beltran et al.)
5,051 children

935,857 children
- 58% household penetration
- Children with access 6-8 percentage points more likely to graduate (Beltran et al.)
37,996 children

43,047 children (13.17% decrease in high school dropout)

* Total K-12 children * 7.4% High school dropout rate
REDUCING HIGH SCHOOL ATTRITION: THE PROVISION OF BROADBAND TO SCHOOLS COMBINED WITH HOT SPOT LENDING COULD INCREASE GRADUATION FOR 23,778 CHILDREN

Total K-12 children in rural counties: 4,415,000

Total high school dropout in rural counties: 326,700 (*)

Population covered by one or more wireless networks

1. Children in households that will adopt high speed broadband as a result of increased coverage and affordable offers
   ~ 4,000 EBS unassigned wireless licenses

2. Children in households that will adopt high speed broadband as a result of increased coverage and affordable offers

15,619 schools served

Schools already served by broadband; thus no incremental effect

0 children

3,676 schools served

• 58% household penetration
• Children with access 6-8 percentage points more likely to graduate (Beltran et al.)

23,778 children

23,778 children (7.28% decrease in high school dropout)

* Total K-12 children * 7.4% High school dropout rate
REDUCING HIGH SCHOOL ATTRITION:
COMMERCIAL-LED PROGRAMS WILL INCREASE HIGH SCHOOL GRADUATION FOR 1,583 CHILDREN

Total K-12 children in rural counties: 4,415,000

Total high school dropout in rural counties: 326,700 (*)

Population covered by one or more wireless networks

1. Children in households that will adopt high speed broadband as a result of increased coverage and affordable offers
   ~ 4,000 EBS unassigned wireless licenses

2. Children in households that will adopt high speed broadband as a result of increased coverage and affordable offers

4,467,165 children
Sprint does not need additional spectrum to offer One million plan in served areas
0 children

935,857 children
• 24 out of 78 counties present a positive NPV of Wireless deployment enabling the offer of One Million
• One Million restricted to High school students

1,583 children

1,583 children (0.48% decrease in high school dropout)

* Total K-12 children * 7.4% High school dropout rate
ASSESSMENT OF ECONOMIC AND SOCIAL VALUE

- Reduction of the digital divide
- Contribution to GDP
- Reduction of the homework gap
- Reduction of high school attrition
- Economic surplus
- Contribution to Treasury
MEASURING ECONOMIC SURPLUS:
The EBS LICENSING MODEL WILL YIELD AN ECONOMIC SURPLUS OF $158.31 MILLION

Households that would pay US $10 instead of US $20 for broadband
• 583,457 households affected by new competition
• 85% adoption

Annual savings by purchasing a cheaper plan per household
• $120

\[ \text{Annual savings} \times \text{Households} = $59.68 \text{ million} \]

Institutions in areas already served by commercial operators
• K-12 schools: 12,114
• Post-secondary schools: 720
• Libraries: 2,785

Annual prorated broadband savings by purchasing from non-profit operator
• $1,263

\[ \text{Annual savings} \times \text{Institutions} = $98.63 \text{ million} \]
ASSESSMENT OF ECONOMIC AND SOCIAL VALUE

- Reduction of the digital divide
- Contribution to GDP
- Reduction of the homework gap
- Reduction of high school attrition
- Economic surplus
  - Contribution to Treasury
CONTRIBUTION TO THE TREASURY: OVERLAY AUCTION PROCEEDS OF THE EBS LICENSES IS ESTIMATED AT $52.25 M (*)

### AVAILABLE SPECTRUM

<table>
<thead>
<tr>
<th>MHz Range</th>
<th>Rural counties</th>
<th>Non-rural counties</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;100 MHz</td>
<td>392</td>
<td>38</td>
<td>430</td>
</tr>
<tr>
<td>99 - 70 MHz</td>
<td>215</td>
<td>75</td>
<td>290</td>
</tr>
<tr>
<td>69 - 50 MHz</td>
<td>6</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>49 - 30 MHz</td>
<td>83</td>
<td>62</td>
<td>145</td>
</tr>
<tr>
<td>29 - 10 MHz</td>
<td>186</td>
<td>122</td>
<td>308</td>
</tr>
<tr>
<td>&lt;10 MHz</td>
<td>10</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>892</td>
<td>306</td>
<td>1,198</td>
</tr>
</tbody>
</table>

### AVAILABLE MHz/POP

<table>
<thead>
<tr>
<th>MHz per POP</th>
<th>Rural Counties</th>
<th>Non-rural counties</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher than 10 million</td>
<td>2</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>9,999,999 – 5,000,000</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>4,999,999– 3,000,000</td>
<td>41</td>
<td>41</td>
<td>82</td>
</tr>
<tr>
<td>2,999,999 – 2,000,000</td>
<td>67</td>
<td>45</td>
<td>112</td>
</tr>
<tr>
<td>1,999,999 – 1,000,000</td>
<td>173</td>
<td>70</td>
<td>243</td>
</tr>
<tr>
<td>999,999 – 800,000</td>
<td>65</td>
<td>20</td>
<td>85</td>
</tr>
<tr>
<td>799,999 – 600,000</td>
<td>103</td>
<td>18</td>
<td>121</td>
</tr>
<tr>
<td>599,999 – 400,000</td>
<td>111</td>
<td>20</td>
<td>131</td>
</tr>
<tr>
<td>399,999 – 200,000</td>
<td>165</td>
<td>20</td>
<td>185</td>
</tr>
<tr>
<td>199,999 – 100,000</td>
<td>86</td>
<td>9</td>
<td>95</td>
</tr>
<tr>
<td>99,999 – 50,000</td>
<td>46</td>
<td>5</td>
<td>51</td>
</tr>
<tr>
<td>49,999 – 30,000</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>29,999 – 20,000</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>19,999 – 10,000</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>9,999 – 5,000</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lower than 4,999</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>892</td>
<td>306</td>
<td>1,198</td>
</tr>
</tbody>
</table>

Auction 86 is the most recent overlay auction of spectrum with similar characteristics and levels of license encumbrance. This yielded proceeds of $0.027 per MHz-pop.

(*) Even if 2.5 GHz spectrum has tripled in value since 2009, total revenue would still be only $156.75 million.
THE TYPICAL LICENSE WOULD BE HEAVILY ENCUMBERED IN ANY POTENTIAL OVERLAY AUCTION, WHICH RESULTS IN ARTIFICIALLY DEPRESSED PRICES DUE TO BIDDING ADVANTAGES FOR EXISTING INCUMBENT LICENSE ENCUMBRANCE IN POTENTIAL EBS OVERLAY AUCTION

Source: FCC Universal Licensing System Data
COMPARATIVE ECONOMIC AND SOCIAL VALUE ANALYSIS SHOWS LICENSING EBS TO EDUCATORS AND NONPROFITS YIELDS GREATER BENEFITS THAN AUCTIONS

<table>
<thead>
<tr>
<th><strong>EBS Licenses</strong></th>
<th><strong>Overlay Auction</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reduction of digital divide</strong></td>
<td>• 18.28% reduction in digital divide</td>
</tr>
<tr>
<td></td>
<td>• 8,356,000 new subscribers</td>
</tr>
<tr>
<td><strong>Increase in GDP</strong></td>
<td>• 1.49% reduction in digital divide</td>
</tr>
<tr>
<td></td>
<td>• 682,000 new subscribers</td>
</tr>
<tr>
<td><strong>Reduction of homework gap</strong></td>
<td>• $ 70.93 billion from increased penetration</td>
</tr>
<tr>
<td></td>
<td>• $ 4.94 billion from increased penetration</td>
</tr>
<tr>
<td><strong>Social effects</strong></td>
<td>• 29.6% reduction in rural homework gap</td>
</tr>
<tr>
<td></td>
<td>• 196,000 children</td>
</tr>
<tr>
<td></td>
<td>• 66,825 additional children graduating from high school</td>
</tr>
<tr>
<td></td>
<td>• Consumer surplus from affordable offers: $59.68 million</td>
</tr>
<tr>
<td></td>
<td>• Producer surplus for anchor institutions: $98.63 million</td>
</tr>
<tr>
<td><strong>Economic surplus</strong></td>
<td>• 1.13% reduction in rural homework gap</td>
</tr>
<tr>
<td></td>
<td>• 7,500 children</td>
</tr>
<tr>
<td></td>
<td>• 1,583 additional children graduating from high school</td>
</tr>
<tr>
<td></td>
<td>• Consumer surplus from affordable offers: $0</td>
</tr>
<tr>
<td></td>
<td>• Producer surplus for anchor institutions: $0</td>
</tr>
<tr>
<td><strong>Contribution to Treasury</strong></td>
<td>• $ 0</td>
</tr>
<tr>
<td></td>
<td>• $ 52.25 million</td>
</tr>
</tbody>
</table>
WHY IS THE DIFFERENCE IN SOCIAL AND ECONOMIC VALUE BETWEEN OPTIONS SO SIGNIFICANT?

- Wireless broadband deployment economics (not a lack of available commercial spectrum) constrain the development of network in rural, unserved counties.
  - Additional spectrum will not change the economic constraints that disincentivize investment in sparsely populated areas
- Commercial wireless carriers do not have an offer focused on increasing adoption by low income population [especially in rural areas]
- Commercial-led homework gap offers (e.g. Sprint’s One Million plan) have limitations that comparable EBS offers do not (e.g. data caps and available only to high school students)
- There is no commercial carrier offer comparable to EBS offers like those available from Mobile Beacon and Mobile Citizen, which focus on affordable service to anchor institutions (schools, libraries, nonprofits) and their users (such as hotspot lending models)
- Proceeds of an overlay auction are limited due to significant encumbrances and the majority of unencumbered spectrum is limited to rural licenses, which generally yield lower proceeds than bids for spectrum in more populated areas
For more information please contact:

Raul Katz, raul.katz@teleadvs.com, +1 (845) 868-1653
Telecom Advisory Services LLC
1349 West 82nd Street
New York, New York 10024 USA