

The Impact of 10 MHz of Wireless Licensed Spectrum

The wireless industry has experienced explosive growth over the past four years, and has delivered spectacular numbers. If we just examine the last four years and attribute the growth that we have seen to the additional 20 MHz¹ (20 MHz AWS1²) that have come on air, we observe the following.

- US GDP increases by \$24.3 billion
- US employment increases by more than 1.6 million
- Government revenues increase by \$7.2 billion
- Wireless service provider revenues increase by \$11.7 billion
- Wireless device revenues increase by \$19.3 billion
- Wireless applications and content sales increase by \$22.3 billion

Exhibit 1: Impact of Additional Spectrum on the US Economy
(monetary units in billions of US\$)

| | 2011 | 2014 | Difference | Impact of 10 MHz incremental spectrum in last 4 years |
|---|-------------|-------------|-------------|---|
| Spectrum | 504 MHz | 524 MHz | 20 MHz | N/A |
| GDP (per year) | \$146.2 | \$194.8 | \$48.6 | \$24.3 |
| Total Wireless Employment | 3.8 million | 7.0 million | 3.2 million | 1.6 million |
| Combined Federal, State, Local and Sales Taxes | \$16.7 | \$31.2 | \$14.4 | \$7.2 |
| Wireless Service | \$164.5 | \$187.8 | \$23.3 | \$11.7 |
| Wireless Devices | \$26.1 | \$64.6 | \$38.5 | \$19.3 |
| Applications and Content | \$8.7 | \$53.2 | \$44.5 | \$22.3 |

Source: Recon Analytics, 2015; differences may not sum to totals shown due to rounding

Some could argue that the explosive growth of the past few years is not sustainable and includes a period of technological shift from 3G to 4G that might not be properly accounted for in the numbers. To account for that, we also calculated the 10-year average impact of an additional 10 MHz of spectrum below:

- US GDP increases by \$3.1 billion
- US employment increases by more than 104,799
- Government revenues increase by \$0.5 billion
- Wireless service provider revenues increase by \$2.6 billion

- Wireless applications and content sales increase by \$1.6 billion

Exhibit 2 shows the state of the wireless industry in 2004 versus 2014, and the difference between those two years. That difference, divided by 32.75, provides the average single-year impact of an additional 10 MHz of spectrum. (327.5 MHz was the change in spectrum that was actually deployed and in service by the end of that 10 year period.) The far right-hand column shows the annual impact of 10 MHz.

Multiplying the figure in the far right-hand column by ten reveals the potential impact of 100 MHz of spectrum.

Exhibit 2: Impact of Additional Spectrum on the US Economy

(monetary units in billions of US\$)

| | 2004 | 2014 | Difference | Impact of 10 MHz incremental spectrum in last 10 years |
|---|-------------|-------------|-------------|--|
| Spectrum | 196.5 MHz | 524 MHz | 327.5 MHz | N/A |
| GDP (per year) | \$92 | \$194.8 | \$102.8 | \$3.14 |
| Total Wireless Employment | 3.6 million | 7.0 million | 3.4 million | 104,799 |
| Combined Federal, State, Local and Sales Taxes | \$15.5 | \$31.2 | \$15.7 | \$0.5 |
| Applications and Content | \$0.5 | \$53.2 | \$52.7 | \$1.6 |

Source: Recon Analytics, 2015; differences may not sum to totals shown due to rounding

In the three years between 2011 and 2014, the wireless industry’s contribution to the US GDP increased from \$146.2 billion in 2011 to reach \$194.8 billion per year in 2014. This indicates that every 10 MHz of spectrum provided to operators creates an increase of \$24.3 billion in additional GDP per year, on average over that three-year span. During the same time, total and induced employment derived from the wireless industry increased from 3.8 million to 7.03 million, indicating that every 10 MHz of spectrum creates more than 1.6 million jobs connected with the wireless industry.

The astounding growth in employment will likely continue as the US economy becomes more competitive through the use of advanced wireless technology and services, with apps

So, what would the addition of 100 MHz of additional spectrum do?

A potential 100 MHz of spectrum could produce great benefits.

Spectrum is the fuel on which wireless runs. If historic relationships between spectrum and GDP, employment, taxes, and industry revenues hold, we can expect that:

10-year Average Impact of 100 MHz

- US GDP increases by up to \$31.0 billion
- Support up to 1 million US jobs
- Government revenues increase up to \$5.0 billion
- Wireless applications and content sales increase up to \$16 billion

and the on-demand economy still primed for considerable growth.

Furthermore, federal, state, local and sales taxes have increased as well. In 2011, these taxes amounted to \$16.7 billion and went up \$14.4 billion to \$31.2 billion in 2014. Every 10 MHz that was put in the hands of wireless service providers generated \$7.2 billion per year for the government. Revenues for wireless services to wireless operators and resellers increased from \$164.5 billion annually in 2011 to \$187.8 billion annually in 2014.

This increase translates into \$11.7 billion per 10 MHz of additional spectrum. Wireless device manufacturers increased sales from \$26.1 billion in 2011 to \$64.6 billion in 2014 as the pace of change and innovation reached dizzying heights. The focus on devices is obvious—it's what you hold in your hands and interact with. But the iPhone and all the devices that its introduction has spawned would have been impossible without functioning, high-speed wireless connectivity.

For wireless device providers, 10 MHz of addition spectrum results in \$19.3 billion of additional sales in 2014, up from \$439 million in 2011. This illustrates the success of smart phones and how much they rely on spectrum. At the same time, additional spectrum, faster data speeds and device capabilities, which in 2011 allowed the wireless application and content market to start its growth has fueled an amazing success story. Revenues increased from about \$8.7 billion in 2011 to \$53.2 billion per year in 2014. When we compiled an earlier version of this report in 2004, apps and content were almost a footnote—at \$500 million per year. Out of that humble start, a \$53-plus billion powerhouse has been born—one with seemingly no limits on growth. Because spectrum is indirectly also the fuel that makes this all possible, every 10 MHz of spectrum created \$22.3 billion in application and content revenues.

Exhibit 3: Spectrum Licensed and Deployed

| Band | 2004 Licensed and Deployed | Mid-2011 Licensed and Deployed | Mid-2011 Licensed | 2014 Licensed and Deployed | 2014 Licensed |
|------------------|----------------------------|--------------------------------|-------------------|----------------------------|---------------|
| Cellular | 50 | 50 | 50 | 50 | 50 |
| PCS | 120 | 130 | 130 | 130 | 140 |
| SMR | 26.5 | 14 | 14 | 14 | 14 |
| 700 MHz | | 46 | 62 | 46 | 70 |
| AWS | | 70 | 90 | 90 | 90 |
| EBS | | 194 | 194 | 194 | 194 |
| WCS | | | | | 20 |
| AWS-3 | | | | | 65 |
| 1670-1675 | | | | | 5 |
| MSS | | | | | 40 |
| Total | 196.5 | 504 | 540 | 524 | 688 |

Source: Recon Analytics, FCC, 2012-2014

¹ Note: We include deployed spectrum in our figures. Companies have won a considerable amount of spectrum that is still being evaluated for deployment. While this spectrum has potential value, unused spectrum doesn't contribute economic value in the same way that deployed spectrum does.

² An additional 20 MHz WCS was deployed in 2015, so we have not included it in our calculations.