A 2017 Assessment *of the* Current & Future Economic Value *of* Unlicensed Spectrum *in the* United States

APRIL 2018 | Dr. Raul Katz | Prepared for WifiForward

From 2013 to 2017, the economic value of unlicensed spectrum, which powers Wi-Fi, grew 129%. This is the finding of the third study by this author on the value of unlicensed spectrum in the United States; the previous studies were both published in 2014. The study examines the direct impact on GDP of the manufacturing and sales of a subset of services, devices and applications like Wi-Fi-only tablets, home assistants, BlueTooth headsets and Zigbee-enabled connected home devices, among others. The study also examines other benefits from the deployment of these technologies, like CAPEX and OPEX savings to cellular operators from offloading mobile traffic onto Wi-Fi or lower bills for consumers because of pervasive home Wi-Fi connections. The study also accounts for market changes since 2014, such as explosive growth in overall internet traffic, explosive development of Bluetooth-enabled applications, and higher certainty about deployment of 5G networks. The study finds that just a subset of technologies contributed $29.06 billion to U.S. GDP in 2017 while generating an economic surplus of at least $496.13 billion today, totaling $525.19 billion. Looking ahead, this study projects the economic contribution of just this group of technologies will continue to increase and reach a total of $834.48 billion by 2020.

Given pace of innovation, capturing the full range of contributions by unlicensed technologies is increasingly difficult—the figures in this report are the readily measurable portion of a larger overall contribution. In fact, the total contribution of unlicensed spectrum is likely substantially higher than the figures reported for the subset considered specifically within this study.

Table A. Summary of future economic value of applications and technologies relying on unlicensed spectrum in the U.S. (2017) (in $ billions)

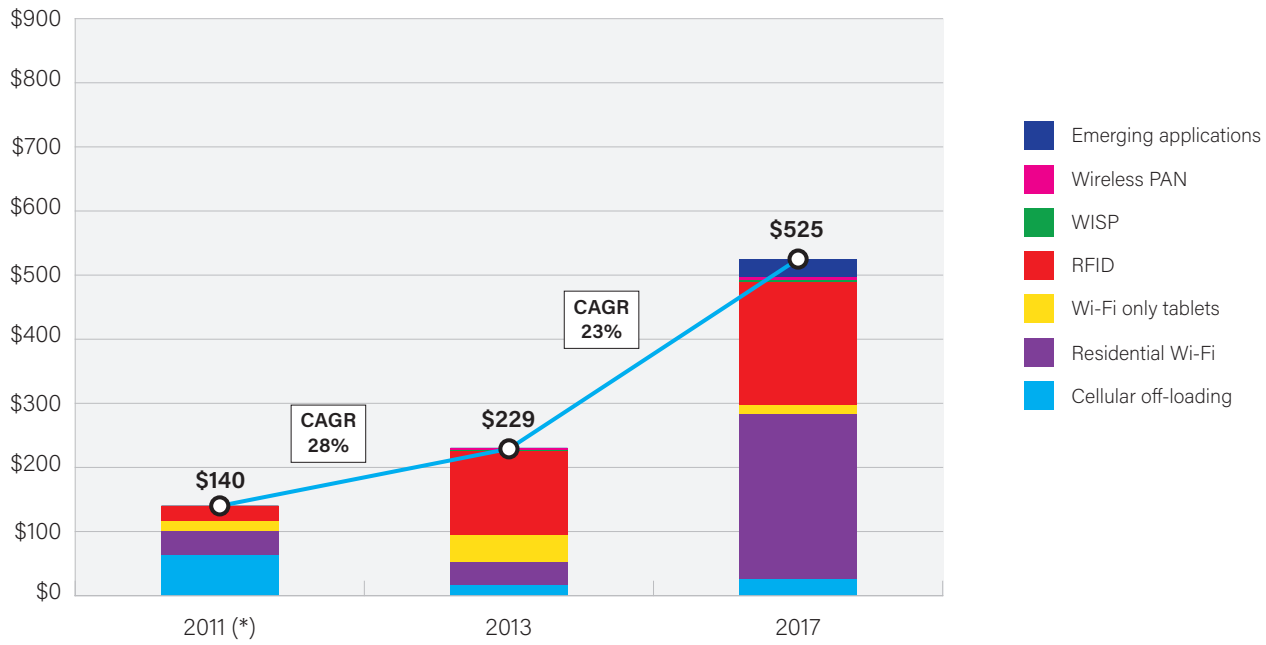
		Economic Surplus			
Drivers	**Technologies and Applications**	**Consumer Surplus**	**Producer Surplus**	**Economic Surplus**	**GDP Contribution**
Value of widely deployed technologies and applications	Wi-Fi cellular off-loading	$5.82	$10.70	$16.52	$8.70
	Residential Wi-Fi	$236.95	$21.75	$258.70	N.A.
	Wireless ISPs	N.A.	N.A.	N.A.	$2.87
	Wi-Fi-only tablets	$4.08	$9.48	$13.56	N.A.
	Wireless personal area networks[1]	N.A.	N.A.	N.A.	$5.53
	RFID	$84.94	$106.31	$191.25	N.A.
	SUBTOTAL	**$331.79**	**$148.24**	**$480.03**	**$17.10**
Value of emerging applications and technologies	High-speed wireless[2]	N.A.	N.A.	N.A.	$0.63
	Low-frequency Wi-Fi	N.A.	N.A.	N.A.	$3.72
	Machine-to-machine[3]	N.A.	N.A.	N.A.	$6.82
	Smart City deployments	$15.10	N.A.	$15.10	$0.79
	Agriculture automation	N.A.	$1.10	$1.00	N.A.
	SUBTOTAL	**$15.10**	**$1.10**	**$16.2**	**$11.96**
TOTAL		$346.89	$149.34	$496.13	$29.06

N.A. (Not applicable) means that primary value creation effect is either in creating economic surplus or contributing to the GDP.

Source: Telecom Advisory Services analysis

$525.19 billion in economic value is a slightly more conservative estimate than the projection in 2014, but it is compensated by explosive growth of technologies not included in the original study, such as connected home assistants like the Amazon Echo and Google Home, and the emergence of new business models like in-flight Wi-Fi. The current assessment also does not account for exponential growth in smartphone traffic or substantial increase in Bluetooth adoption. Growth in these sectors, combined with the role that unlicensed technologies will play in 5G deployment, will result in a massive uptick in Wi-Fi economic value, totaling $834.48 billion by 2020.

Graph A. Economic value of unlicensed spectrum in the U.S. (2011-2017)



(*) Composite of previous research by Thanki (2009), Milgrom et al. (2011), and Cooper (2012)

Source: Telecom Advisory Services analysis

Beyond the numerical findings, three additional conclusions have been drawn:

- The economic value of unlicensed continues to grow, due to the flexible nature of the spectrum. Current drivers of this growth are IoT and 5G adoption.

- Due to the innovation-friendly nature of the spectrum, its economic value continues to grow even though the drivers of that growth have varied significantly. Unlicensed spectrum breeds competition among similar technologies (for example, Bluetooth vs. Wireless-Hart), which results in an increase in the value of one technology coupled with a complementary decrease in the value of another. In the case of Bluetooth, the value increased 166% between 2013-2017, while the value of Wireless-Hart technologies fell 81% in the same period.

- If no additional unlicensed spectrum is allocated, the large economic impact of unlicensed-based technologies will shrink accordingly. There will also be negative impacts on the effectiveness of unlicensed-based services, including Wi-Fi speeds and cellular offload. Should no additional unlicensed spectrum be allocated in advance of this projected growth, there will be very real economic consequences. For example, a spectrum crunch may prevent Wi-Fi offload of cellular traffic, which could have a negatively impact GDP by as much $9.8 billion by 2020. This does not include the negative impact of $3.0 billion or more that would arise if the spectrum crunch also prevents the forecasted increase in Wi-Fi speeds. Additional negative economic implications would include service degradation in public places, and potential degradation of cellular service by Wi-Fi technologies due to increased competition for limited bandwidth, which would significantly shrink the $10.7 billion economic surplus that is generated by the complementarity of the two technologies.