

# THE ECONOMIC IMPACT OF DEVELOPING THE FIRSTNET BAND 14 RADIO ACCESS NETWORK (RAN)

## Executive Summary

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# ForsMarsh

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## Introduction

In 2012, Congress established the [First Responder Network Authority](#) (FirstNet Authority) in response to the communication challenges first responders experienced during the attacks on September 11, 2001. The FirstNet Authority is an independent agency within the U.S. Department of Commerce’s National Telecommunications and Information Administration, and its mission is to “oversee the buildout, deployment, and operation of the Nationwide Public Safety Broadband Network (NPSBN) called FirstNet.” FirstNet comprises a public–private partnership between the FirstNet Authority and AT&T Mobility Services, LLC (AT&T), and serves as the dedicated broadband network for public safety communications.

FirstNet’s dedicated Band 14 spectrum offers priority and preemption for first responders, ensuring that they have open lines of communication when responding to emergencies. In 2017, the FirstNet Authority awarded AT&T a task order to “deploy the network’s Band 14 coverage, including radio access networks<sup>1</sup> [RAN] that connect to the [network’s] core” (FirstNet Authority, 2022). Between 2017 and 2023, AT&T deployed Band 14 spectrum across tens of thousands of RAN sites, in addition to providing connectivity across all AT&T commercial spectrum bands, to cover more than 2.91 million square miles of the country (AT&T, 2023). From building FirstNet’s Band 14 RAN to equipping frontline first responders with telecommunications devices, FirstNet represents an investment of billions of dollars in public safety communications.

The FirstNet Authority contracted Fors Marsh to estimate the economic and social impact of FirstNet on public safety operations and on changes to the wireless communication market. Fors Marsh has previously examined FirstNet’s adoption by public safety agencies, first responders’ level of trust and satisfaction with FirstNet, and the impact of FirstNet on first responders’ communications capabilities. In this report, we examine the estimated impact of AT&T’s development of the FirstNet RAN between 2017 to 2023 on jobs, wages and salaries, and the net economic output across industries.<sup>2</sup> We estimated the economic impact using the U.S. Bureau of Economic Analysis’s (BEA) [Regional Input–Output Modeling System \(RIMS II\)](#). Our estimates account for the direct, indirect, and induced effects of FirstNet RAN development, yielding a comprehensive picture of its economic impact on the American economy.

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## Impact of FirstNet Radio Access Network (RAN) Development on Economic Output, Jobs, and Wages and Salaries

Based on a total investment of approximately \$6.5 billion in the network between 2017 and 2023, FirstNet RAN development was associated with an increase of \$8.0 billion in net economic output across all industries and \$5.6 billion in total wages and salaries for workers and households across the country (Table 1). In other words, every \$1.00 in FirstNet RAN development is associated with \$1.20 net economic output (including FirstNet expenditures).

Building the FirstNet RAN also created an average of 13,877 jobs per year over the 7-year period, with an estimated range of 103 to 28,460 jobs created per year (Table 2). We present the average jobs created rather than the totals across years because, under the assumptions of our model, these jobs did not persist beyond

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<sup>1</sup> A cell tower or a base station is a tall physical structure equipped with antennas and radios that is designed to provide cell service. The antennas and radios supported by cell towers are referred to more broadly as “cell sites.” The wireless industry refers to the totality of this equipment as the RAN (Cybersecurity and Infrastructure Security Agency, 2022; Delany, 2018).

<sup>2</sup> For the purposes of this study, FirstNet RAN development was defined as adding Band 14 equipment on an existing cell site or the construction of a new cell site with Band 14 equipment.

the period of FirstNet expenditure; thus, they should not be accumulated. These jobs were mostly concentrated in the construction industry, which was the final-demand industry used in the analyses.

*Table 1. Net Economic Output and Wages and Salaries Attributable to FirstNet RAN Development by Year*

	2017	2018	2019	2020	2021	2022	2023	Total
Net economic output	\$8.8 million	\$2,293.7 million	\$2,359.7 million	\$1,971.4 million	\$1,016.1 million	\$341 million	\$50.1 million	\$8,040.9 million
Wages and salaries	\$6.1 million	\$1,596.4 million	\$1,646.2 million	\$1,379.4 million	\$710.9 million	\$239.5 million	\$34.8 million	\$5,613.3 million

*Table 2. Number of Jobs Attributable to FirstNet RAN Development by Year*

	2017	2018	2019	2020	2021	2022	2023	Average per year
Jobs	103	27,555	28,460	23,995	12,259	4,173	597	<b>13,877</b>

### **3** Methodology

Fors Marsh estimated the total net economic output, jobs created, and wages and salaries using the BEA’s RIMS II. Input–output (I–O) models, such as RIMS II, estimate the economic impact of industries working together within an economy. In an I–O model, an *input* is the materials and labor that one industry needs to produce goods and services. An *output* is what is produced by an industry with the materials and labor they have procured—that is, the final product that an industry produces with the inputs. In short, an I–O model quantifies how changes in one industry affect other related industries. For example, to estimate the economic impact of the automobile industry, we would examine the range of inputs used by automobile manufacturers (e.g., rubber, glass, steel) relative to the outputs of the industry (e.g., cars and trucks).

One benefit of an I–O model like RIMS II is that it measures how economic investments are distributed throughout the economy. By assuming that industries are interconnected, the model estimates direct, indirect, and induced effects:

A *direct effect* is an initial change in an industry that is directly affected by an economic activity or event. For the FirstNet RAN development, we assumed that the direct effects were concentrated in the nonresidential construction industry.

An *indirect effect* is a change in economic activity in industries that supply goods and services to the directly affected industry. For the FirstNet RAN development, indirect effects would be observed in the industries that supply goods and services to the Nonresidential Structures Construction industry, such as manufacturers of the building components and legal services for permitting.

An *induced effect* is a change in economic activity that results from alterations in household income and spending due to the direct and indirect effects. For the FirstNet RAN development, the induced effects were the spillovers that resulted from RAN development; for example, the available income that workers spent at restaurants and grocery stores.

Conducting an I–O analysis requires identifying an industry to serve as the “final-demand” industry for the expenditures. Although AT&T identifies as part of the Wireless Telecommunications Carriers (except

Satellite) industry (North American Industry Classification System [NAICS] 517210), Fors Marsh diligently identified other industries more aligned to the specific activity of the FirstNet RAN development. Based on the documentation for RAN development expenditures, we concluded that the Nonresidential Structures Construction (NAICS 2332E0) industry was the single-best industry to use as the final-demand industry in RIMS II.

### ***Model Considerations***

We estimated outputs using the state-level version of RIMS II. Because the national-level estimates that we reported are the sum of the state-level estimates, they may over or underestimate the cumulative national impact on gross output by industry due to cross-state sourcing of inputs. Also, because BEA and RIMS II treat part-time and full-time jobs as equivalent for calculating employment multipliers, the estimates of the employment effect represent an increase in the sum of part-time and full-time employment, rather than the number of full-time equivalent employment. In addition, the RIMS II-provided industry linkages and multipliers are fixed; thus, they do not account for technological changes over the course of our study.

### ***Data and Model Validation***

Fors Marsh partnered with Optimal Solutions Group (OSG) to conduct an independent replication and comparison of findings. The purpose of this replication was to validate Fors Marsh's estimates of the FirstNet RAN development's impact on net economic output, jobs, and wages and salaries. As a first step, OSG conducted an independent calculation of expenditure distribution across states and years. The differences between OSG and Fors Marsh's calculations were all trivial (i.e., less than \$10) and likely due to rounding inconsistencies. Thus, we determined that these differences would not contribute to differences in the estimates of FirstNet RAN development's impact.

Next, OSG independently calculated estimates of FirstNet RAN development's impact on net economic output, jobs, and wages and salaries using RIMS II. Across all years, the largest differences between Fors Marsh and OSG's estimates for net economic output, jobs, and wages and salaries were less than 1 percentage point. For this reason, OSG determined that the Fors Marsh estimates were accurate.

## **4**

### **References**

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