

Attachment ~~12~~
Labor Categories / Position Descriptions
REVISION 1

The tables below provide position descriptions and qualifications for the labor categories expected to be required to perform the activities outlined in the PWS. The following apply to all position descriptions:

- Minimum Years' Experience shall be experience working in the same role and function as described in the position description – general work experience or experience in another field shall not be counted in meeting the years' experience criteria
- All noted certifications are **required** unless specifically noted as “preferred”

PROJECT MANAGEMENT

Labor Category	Experience / Capabilities	Min. Years' Experience	Relevant Certs / Qualifications
Project Manager	<p><u>Project Management</u></p> <ul style="list-style-type: none"> • A senior level manager with demonstrated experience managing engineering projects and teams of a similar size, scope, and complexity to PWS requirements • Responsible for all aspects of project and contract management, project planning, staffing, cost, schedule, performance, deliverables, and quality control • Effectively engages with government stakeholders to understand requirements and priorities • Develops and delivers executive-level updates and communications to government project managers and senior stakeholders <p><u>Engineering Expertise & Oversight</u></p> <ul style="list-style-type: none"> • Meets or exceeds the education and engineering experience requirements of the Senior RF/RAN Engineer • Provides oversight and quality control for all technical analyses and deliverables completed by the Contractor team • Acts as senior advisor to FCC management for all engineering and analytical requirements and process improvement initiatives 	<p>5+ years program management or project lead experience on projects of similar size and scope</p> <p>At least engineering experience equal to or greater than that of the Senior RF/RAN Engineer</p>	<ul style="list-style-type: none"> ▪ Bachelor's or postgraduate degree in electrical engineering, electronic technology, or another similar technical discipline ▪ Training in 3GPP-based and other wireless technologies, radio wave propagation, and radio access and core network architecture and system design (please specify source of the training and any associated certifications) (preferred) ▪ Project Management Professional (PMP) Certification (preferred)
Project Support Analyst	<ul style="list-style-type: none"> • Provides administrative management support to the Project Manager in all areas related to project management, staffing and financial analysis, project reporting, communications, meeting scheduling, invoicing, contract management and other related support • Proficiency with scheduling and project management tools • Experience supporting project management for projects of similar size and scope 	<p>1+</p>	

WIRELESS NETWORK ENGINEERING

Labor Category	Experience / Capabilities	Min. Years' Experience	Relevant Certs / Qualifications
RF/RAN Engineer	<p><u>Core Experience</u></p> <ol style="list-style-type: none"> 1) Familiarity and some experience with RF/microwave components, radio receiver, transmitter, antenna, and propagation principles and applications <ol style="list-style-type: none"> a) Familiar with RF/microwave component functions and specifications (e.g., isolators, circulators, filters) b) Familiar with wireless receiver specifications (e.g., sensitivity, intermodulation), noise figure calculations, SINR requirements c) Familiar with wireless transmitter specifications (e.g., power amplifier, average vs. peak power) d) Familiar with RF signal chain calculations e) Familiar with antenna types (e.g., omni, panel, cross polarization), MIMO (e.g., 2x2, 4x4, massive), beamforming (e.g., switch beam, adaptive array), specifications (e.g., gain, beamwidth, return loss), and deployments f) Familiarity and some experience with RF/microwave propagation models (e.g., Cost231-Hata, ITM, ray-tracing, pathloss slope/exponent, 3GPP), applications (e.g., spectrum band, radio technology), and tuning (e.g., optimizing model coefficients using drive test data) g) Familiar with wireless network design and analysis (e.g., traffic engineering, capacity planning, infrastructure data, wireless link budgets analysis and calculations, coverage analysis, probability of coverage, fade margins, interference margin, spectrum efficiencies, noise floor, gains and losses, target data rates) 2) Familiarity and some experience with wireless network design tools <ol style="list-style-type: none"> a) Familiar with wireless network coverage and interference studies b) Familiar with terrain and clutter data and how these affect coverage studies <p><u>Preferred Experience</u></p> <ol style="list-style-type: none"> 3) Familiarity and some experience with 5G/4G/3G/Fixed Wireless/Wi-Fi (802.11ac/ax) RAN (Radio Access Network) principle, architecture, design, analysis, optimization, engineering, and deployment <ol style="list-style-type: none"> a) Familiar with 3GPP technologies (e.g., HSPA, LTE and 5G-NR) at the physical, MAC and higher layer, and IEEE 802.11 family technologies b) Familiar with wireless network architectures (e.g., LTE and 5G-NR NSA, 5G-NR SA) c) Familiar with wireless network optimization and deployment (e.g., drive testing requirements and configuration, test tools and set-up (e.g., iperf, Ookla, xcal/xcap, nemo, qualipoc, qxdm, spectrum analyzer), data collection, data processing, propagation model tuning based on test data, KPI metrics) 4) GIS and data analysis <ol style="list-style-type: none"> a) Familiar with GIS data and spatial interpolation (e.g., Kriging) analysis b) Familiar with drive test data analysis c) Familiar with statistical analysis 	<p>At least 4-5 Years Engineering Experience (or more)</p> <p>Familiarity and some practical experience within each defined area</p>	<ul style="list-style-type: none"> ▪ Bachelor's or postgraduate degree in electrical engineering, electronic technology, or another similar technical discipline ▪ Formal training in 3GPP-based wireless technologies, radio wave propagation, and radio access and core network architecture and system design (please specify source of the training and any associated certifications)

Labor Category	Experience / Capabilities	Min. Years' Experience	Relevant Certs / Qualifications
Senior RF/ RAN Engineer	<ol style="list-style-type: none"> 1) Practical experience with RF/microwave components, radio receiver, transmitter, antenna, and propagation principles and applications <ol style="list-style-type: none"> a) Understanding of and practical experience with RF/microwave component functions and specifications (e.g., isolators, circulators, filters) b) Expertise and experience with wireless receiver specifications (e.g., sensitivity, intermodulation), noise figure calculations, SINR requirements c) Understanding of wireless transmitter specifications (e.g., power amplifier, average vs. peak power) d) Expertise and experience with RF signal chain calculations e) Understanding of and experience with antenna types (e.g., omni, panel, cross polarization), MIMO (e.g., 2x2, 4x4, massive), beamforming (e.g., switch beam, adaptive array), specifications (e.g., gain, beamwidth, return loss), and deployments f) Significant experience with RF/microwave propagation models (e.g., Cost231-Hata, ITM, ray-tracing, pathloss slope/exponent, 3GPP), applications (e.g., spectrum band, radio technology), and tuning (e.g., optimizing model coefficients using drive test data) 2) Practical experience with 5G/4G/3G/Fixed Wireless/Wi-Fi (802.11ac/ax) RAN (Radio Access Network) principle, architecture, design, analysis, optimization, engineering, and deployment <ol style="list-style-type: none"> a) Demonstrated expertise and experience with 3GPP technologies (e.g., HSPA, LTE and 5G-NR) at the physical, MAC and higher layer), and IEEE 802.11 family technologies b) Demonstrated expertise and experience with wireless network architectures (e.g., LTE and 5G-NR NSA, 5G-NR SA) c) Demonstrated expertise and experience with wireless network design and analysis (e.g., traffic engineering, capacity planning, infrastructure data, wireless link budgets analysis and calculations, coverage analysis, probability of coverage, fade margins, interference margin, spectrum efficiencies, noise floor, gains and losses, target data rates) d) Demonstrated expertise and experience with wireless network optimization and deployment (e.g., drive testing requirements and configuration, test tools and set-up (e.g., iperf, Ookla, xcal/xcap, nemo, qualipoc, qxdm, spectrum analyzer), data collection, data processing, propagation model tuning based on test data, KPI metrics) 3) Practical experience with wireless network design tools <ol style="list-style-type: none"> a) Demonstrated expertise and experience with wireless network coverage and interference studies b) Demonstrated expertise and experience with terrain and clutter data and how these affect coverage studies 4) GIS and data analysis <ol style="list-style-type: none"> a) Some expertise with GIS data and spatial interpolation (e.g., Kriging) analysis b) Some expertise with drive test data analysis c) Some expertise with statistical analysis 	<p>At least 5-8 Years Engineering Experience (or more)</p> <p>1-3 years practical experience within each defined area</p>	<ul style="list-style-type: none"> ▪ Bachelor's or postgraduate degree in electrical engineering, electronic technology, or another similar technical discipline ▪ Formal training in 3GPP-based wireless technologies, radio wave propagation, and radio access and core network architecture and system design (please specify source of the training and any associated certifications)

Labor Category	Experience / Capabilities	Min. Years' Experience	Relevant Certs / Qualifications
Principal RF/RAN Engineer	<ol style="list-style-type: none"> 1) Significant experience with RF/microwave components, radio receiver, transmitter, antenna, and propagation principles and applications <ol style="list-style-type: none"> a) Extensive knowledge of RF/microwave component functions and specifications (e.g., isolators, circulators, filters) b) Proficient in wireless receiver specifications (e.g., sensitivity, Rx intermodulation, dynamic range, ACS, blocking, Rx spurious emission, in-channel selectivity), noise figure calculations, SINR requirements c) Proficient in wireless transmitter specifications (e.g., power amplifier (PA), PA nonlinearity, average vs. peak power (PAPR), EVM, OBUE, ACLR, Spurious Emission, Tx intermodulation) d) Proficient in RF signal chain calculations e) Proficient in antenna types (e.g., omni, panel, cross polarization), MIMO (e.g., 2x2, 4x4, massive 64TRX), beamforming (e.g., switch beam, adaptive array, 2D/3D BF, Analog/Digital/Hybrid), specifications (e.g., gain, beamwidth, return loss, VSWR), and deployments f) Proficient in RF/microwave propagation models (e.g., Cost231-Hata, ITM, ray-tracing, pathloss slope/exponent, 3GPP), applications (e.g., spectrum band, radio technology), and tuning (e.g., optimizing model coefficients using drive test data) g) Proficient in mmW (5G-NR FR2, Microwave PtMP/PtP) HW systems and its propagation/channel characteristics 2) Significant experience with 5G/4G/3G/Fixed Wireless/Wi-Fi (802.11ac/ax) RAN (Radio Access Network) principle, architecture, design, analysis, optimization, engineering, and deployment. <ol style="list-style-type: none"> a) Proficient in 3GPP technologies (e.g., HSPA, LTE and 5G-NR) at the physical, MAC and higher layer), and IEEE 802.11 family technologies b) Proficient in OFDM/OFDMA technology and its performance c) Proficient in RAN HW system (Antenna-RRH integrated, CPRI/e-CPRI, BBU, Backhaul, CSR) d) Proficient in wireless network architectures (e.g., LTE and 5G-NR NSA, 5G-NR SA) e) Proficient in wireless network design and analysis (e.g., traffic engineering, capacity planning, infrastructure data, wireless link budgets analysis and calculations, coverage analysis, spectrum/signal analysis, probability of coverage, fade margins, interference margin, spectrum efficiencies, noise floor, gains / losses, target data rates) f) Proficient in wireless network optimization and deployment (e.g., drive test requirements and configuration, test tools and set-up (e.g., iperf, Ookla, xcal/xcap, nemo, qualipoc, qxdm, spectrum analyzer), data collection, data processing, propagation model tuning based on test data, KPI metrics) 3) Significant experience with wireless network design tools (e.g., Atoll). <ol style="list-style-type: none"> a) Proficient in wireless network coverage and interference studies b) Proficient in terrain and clutter data and how these affect coverage studies 4) GIS and data analysis <ol style="list-style-type: none"> a) Proficient in GIS data and spatial interpolation (e.g.. Kriging) analysis b) Proficient in drive test data analysis c) Proficient in statistical analysis 	<p>At least 8 or more Years Engineering Experience</p> <p>5+ years practical experience within each defined area</p>	<ul style="list-style-type: none"> ▪ Bachelor's or postgraduate degree in electrical engineering, electronic technology, or another similar technical discipline ▪ Formal training in 3GPP-based wireless technologies, radio wave propagation, and radio access and core network architecture and system design (please specify source of the training and any associated certifications)

Labor Category	Experience / Capabilities	Min. Years' Experience	Relevant Certs / Qualifications
RF/RAN Engineer – Subject Matter Expert (SME)	Meets ALL requirements of Principal RF/Network Engineer, plus: <ul style="list-style-type: none"> • Is a certified Professional Engineer; • At least 3+ years' experience working directly at, or in support of, a US-based Tier 1 mobile network operator, chipset supplier, or infrastructure supplier 	10+	Certified Professional Engineer

ANALYTICAL SUPPORT SERVICES

Labor Category	Experience / Capabilities	Min. Years' Experience	Relevant Certs / Qualifications
Junior Data Analyst	<ol style="list-style-type: none"> 1) Understanding and some experience with statistical analysis software packages and basic programming (e.g., Python, Java, JavaScript, SQL, Pig or R, SAS, SPSS, FME, Matlab, etc.) 2) Some experience with managing large datasets including data structuring, standardization, indexing, etc. 3) Familiarity with database structure systems, data models and performance tuning, data mining, data warehousing, and segmentation techniques 4) Familiarity with cloud-based tools such as Azure Databricks, Azure Data Lake, or similar platforms 5) Ability to work with a variety of data sources including flat files, relational databases, Software-as-a-Service (SaaS) applications and web sites using techniques including direct connections (JDBC/ODBC) and REST APIs 6) Ability to manipulate both structured and unstructured data in a data analytics environment using tools such as SQL and related technologies (SSRS/SSIS), Python, Databricks or Apache Spark, Azure data storage and other data movement/transformation technologies (e.g., Azure Data Lake) 7) Experience creating presentations using PowerPoint and some experience with Business Intelligence (BI) and data visualization software (e.g., Power BI, Tableau, Excel, i2, ArcGIS, QGIS, PostGIS, etc.) to effectively support frequent data refresh and convey insights to the BDC program. Examples include, but are not limited to, creation of USA maps with wireless coverage from data submitted from service providers, statistical metrics of service providers' wireless coverage, as well as metrics related to the challenge and verification cases 8) Familiarity with GIS data and various GIS data analyses and spatial interpolation techniques (e.g., Kriging) 9) Ability to work collaboratively across teams 	1	<ul style="list-style-type: none"> ▪ Bachelor's or post-graduate degree in engineering, mathematics, computer science or other relevant discipline

Labor Category	Experience / Capabilities	Min. Years' Experience	Relevant Certs / Qualifications
Mid-Level Data Analyst	<ol style="list-style-type: none"> 1) Practical experience with statistical analysis software packages and basic programming (e.g., Python, Java, JavaScript, SQL, Pig or R, SAS, SPSS, FME, Matlab, etc.) 2) Experience with managing large datasets and best practices in data management including data structuring, standardization, indexing, etc. 3) Knowledge of various database structure systems, data models and performance tuning, data mining, data warehousing, and segmentation techniques 4) Practical experience with one or more cloud-based tools such as Azure Databricks, Azure Data Lake, or similar platforms 5) Expertise and practical experience working with a variety of data sources including flat files, relational databases, Software-as-a-Service (SaaS) applications and web sites using techniques including direct connections (JDBC/ODBC) and REST APIs 6) Expertise and practical experience with manipulation of both structured and unstructured data in a data analytics environment using tools such as SQL and related technologies (SSRS/SSIS), Python, Databricks or Apache Spark, Azure data storage and other data movement/transformation technologies (e.g., Azure Data Lake) 7) Demonstrated experience creating presentations using PowerPoint and proficiency with various data visualization software (e.g., Power BI, Tableau, Excel, i2, ArcGIS, QGIS, PostGIS, etc.) to effectively convey insights from data to support FCC management decision making. Examples include, but are not limited to, creation of USA maps with wireless coverage from data submitted from service providers, statistical metrics of service providers' wireless coverage, as well as metrics related to the challenge and verification cases 8) Experience with GIS data and application of various GIS data analyses and spatial interpolation techniques (e.g., Kriging) to solve analytical problems 9) Ability to work collaboratively across teams and effectively interact with mid-level management 10) Some experience managing and structuring analytical work for junior analysts 	3	<ul style="list-style-type: none"> ▪ Bachelor's or post-graduate degree in engineering, mathematics, computer science or other relevant discipline

Labor Category	Experience / Capabilities	Min. Years' Experience	Relevant Certs / Qualifications
Senior Data Analyst	<ol style="list-style-type: none"> 1) Extensive knowledge of and proficiency in using various statistical analysis software packages and programming languages (e.g., Python, Java, JavaScript, SQL, Pig or R, SAS, SPSS, FME, Matlab), spatial analysis tools and concepts, data mining methods, database structures and analytic information extraction and visualization techniques 2) Proficiency in managing large datasets and deep knowledge of best practices in data management including data structuring, standardization, indexing, etc. 3) Extensive knowledge of and experience with various database structure systems, data models and performance tuning, data mining, data warehousing, and segmentation techniques 4) Practical experience with one or more cloud-based tools such as Azure Databricks, Azure Data Lake, or similar platforms 5) Proficiency and practical experience working with a variety of data sources including flat files, relational databases, Software-as-a-Service (SaaS) applications and web sites using techniques including direct connections (JDBC/ODBC) and REST APIs 6) Proficiency and practical experience with manipulation of both structured and unstructured data in a data analytics environment using tools such as SQL and related technologies (SSRS/SSIS), Python, Databricks or Apache Spark, Azure data storage and other data movement/transformation technologies (e.g., Azure Data Lake) 7) Significant experience creating presentations using PowerPoint and proficiency with various data visualization software (e.g., Power BI, Tableau, Excel, i2, ArcGIS, QGIS, PostGIS, etc.) to effectively convey insights from data to support FCC management decision making. Examples include, but are not limited to, creation of USA maps with wireless coverage from data submitted from service providers, statistical metrics of service providers' wireless coverage, as well as metrics related to the challenge and verification cases 8) Training in applied mathematics including statistics and mathematical modeling to support temporal and pattern analysis, correlation of events, probability analysis, assessments of sampling, analysis of variance and error, and regression testing and analysis 9) Deep knowledge and practical experience with GIS data and application of various GIS data analyses and spatial interpolation techniques (e.g., Kriging) to solve analytical problems 10) Significant experience defining and structuring analytical approaches/methodologies to solve specific analytical problems 11) Ability to work collaboratively across teams and effectively interact with senior-level management 12) Significant experience managing analyst teams and guiding junior resources in effective application of analytical techniques 	<p style="text-align: center;">5+</p>	<ul style="list-style-type: none"> ▪ Bachelor's or post-graduate degree in engineering, mathematics, computer science or other relevant discipline