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## 1 Document Overview

This document provides details pertaining to the target Initial Operational Capability (IOC)/Final Operational Capability (FOC) timeline for the First Responder Network Authority (FirstNet) Nationwide Public Safety Broadband Network (NPSBN). This timeline correlates with the 3rd Generation Partnership Project (3GPP) standard body release timeline; the milestones of the corresponding NPSBN deployment are referenced herein. This document should be read in conjunction with Section B, Supplies or Services and Prices/Costs.

## 2 IOC/FOC Target Timeline

The timing of the features and functions within the IOC/FOC timeline may be adjusted per the publication and availability of 3GPP releases and their associated features and functionalities.

The IOC-3 reference to Next Generation 9-1-1 (NG911) should take into consideration Section 4.4.6.3, NG 911 Services, from Section J, Attachment J-3, FCC TAB RMTR.

The coverage-related IOC/FOC milestones apply to persistent coverage, which satisfies the coverage requirements. Temporary coverage, such as that provided by deployable units or backpack transmitters, may be used to complement persistent coverage. However, temporary coverage does not count toward the IOC/FOC coverage deployment percentage goals.

“Completed” is defined as when all relevant components—devices, network, services, and applications—are deployed, operating, and generally available to provide end-to-end service.

Table 1 IOC/FOC Milestones

Timing/Area		IOC-1 6 months from award	IOC-2 12 months	IOC-3 24 months	IOC-4 36 months	IOC-5 48 months	FOC 60 months
<b>3GPP MILESTONES</b>							
A.	<b>3GPP Release</b>	<ul style="list-style-type: none"> <li>3GPP Release 12 generally available</li> </ul>		<ul style="list-style-type: none"> <li>3GPP Release 13 generally available</li> </ul>		<ul style="list-style-type: none"> <li>3GPP Release 14 generally available</li> </ul>	
<b>NATIONWIDE MILESTONES</b>							
B.	<b>State Plans and Delivery Mechanism</b>	<ul style="list-style-type: none"> <li>Complete and issue all state plans (Task Order #2)</li> <li>Launch of the Web interface for state plan delivery (Task Order #1)</li> </ul>					
C.	<b>Coverage and Capacity Solutions (State and Territory Task Orders)</b>	<ul style="list-style-type: none"> <li>Nationwide coverage on Band-14 or Non Band-14</li> <li>Band 14 deployables available</li> <li>Range extension services</li> <li>Band 14 laboratory tests</li> </ul>					
D.	<b>Products and Architecture (Task Order #3)</b>	<ul style="list-style-type: none"> <li>Completion of data and voice services Phase 1</li> <li>Completion of QPP</li> </ul>	<ul style="list-style-type: none"> <li>Completion of data and voice services Phase 2</li> <li>Completion of QPP</li> </ul>	<ul style="list-style-type: none"> <li>Completion mission-critical services, systems, and operations Phase 1</li> </ul>	<ul style="list-style-type: none"> <li>Completion of mission-critical services, systems, and operations Phase 2</li> </ul>	<ul style="list-style-type: none"> <li>Completion of mission-critical services, systems, and operations Phase 3</li> </ul>	<ul style="list-style-type: none"> <li>Delivery of all IOC services, applications, infrastructure,</li> </ul>

Timing/Area	IOC-1 6 months from award	IOC-2 12 months	IOC-3 24 months	IOC-4 36 months	IOC-5 48 months	FOC 60 months
<ul style="list-style-type: none"> <li>• Services</li> <li>• Applications</li> <li>• Devices</li> <li>• Architecture and Infrastructure</li> <li>• Operations</li> </ul>	<ul style="list-style-type: none"> <li>Phase 1 (Framework)</li> <li>• Completion of ICAM Phase 1</li> <li>• Completion of applications ecosystem Phase 1</li> <li>• Completion of local control application Phase 1</li> <li>• Completion of PSE home page</li> <li>• Completion of devices Phase 1</li> <li>• Completion of Core infrastructure Phase 1</li> <li>• Completion of infrastructure hardening Phase 1</li> <li>• Completion of security Phase 1</li> <li>• Launch of initial network operations (Band 14 or non-Band 14)</li> <li>• Launch agency systems onboarding</li> <li>• Completion of PSEN</li> </ul>	<ul style="list-style-type: none"> <li>Phase 2 (Static QPP)</li> <li>• Completion of ICAM Phase 2</li> <li>• Completion of applications ecosystem Phase 2</li> <li>• Completion of public safety applications Phase 1</li> <li>• Completion of local control application Phase 2</li> <li>• Completion of devices Phase 2</li> <li>• Completion of Core infrastructure Phase 2</li> <li>• Completion of infrastructure hardening Phase 2</li> <li>• Completion of security Phase 2</li> <li>• Launch of Band 14 network operations</li> <li>• Launch of FirstNet operational SMC</li> <li>• Launch FirstNet field operations</li> <li>• Completion of PSEN</li> </ul>	<ul style="list-style-type: none"> <li>• Completion of QPP Phase 3 (Dynamic QPP)</li> <li>• Completion of applications ecosystem Phase 3</li> <li>• Completion of public safety applications Phase 2</li> <li>• Completion of local control application Phase 3</li> <li>• Completion of devices Phase 3</li> <li>• Completion of Core infrastructure Phase 3</li> <li>• Completion of infrastructure hardening Phase 3</li> <li>• Completion of security Phase 3</li> <li>• Completion of PSEN onboarding and interconnection Phase 3</li> <li>• Completion of RF site integration to Core Phase 2</li> </ul>	<ul style="list-style-type: none"> <li>• Completion of location-based service enhancements</li> <li>• Evolve systems, services, and devices to meet growth and feature enhancements</li> <li>• Completion of Core infrastructure Phase 4</li> <li>• Completion of infrastructure hardening Phase 4</li> <li>• Completion of security Phase 4</li> <li>• Completion of PSEN onboarding and interconnection Phase 4</li> <li>• Completion of RF site integration to Core Phase 3</li> </ul>	<ul style="list-style-type: none"> <li>• Completion of Core infrastructure Phase 5</li> <li>• Completion of infrastructure hardening Phase 5</li> <li>• Completion of security Phase 5</li> <li>• Completion of PSEN onboarding and interconnection Phase 5</li> <li>• Completion of RF site integration to Core Phase 4</li> </ul>	<ul style="list-style-type: none"> <li>and operations milestones to meet FOC objectives</li> <li>• Satisfaction of evolution and roadmap development milestones and objectives</li> <li>• Satisfaction of PSEN integration objectives</li> <li>• Satisfaction of RF site integrations to Core objectives</li> <li>• Satisfaction of operational objectives</li> </ul>

Timing/Area		IOC-1 6 months from award	IOC-2 12 months	IOC-3 24 months	IOC-4 36 months	IOC-5 48 months	FOC 60 months
		onboarding and interconnection Phase 1 <ul style="list-style-type: none"> <li>• Completion of non-Band 14 public safety user migration Phase 1</li> <li>• Completion of non-Band 14 network operations</li> </ul>	onboarding and interconnection Phase 2 <ul style="list-style-type: none"> <li>• Completion of RF site integration to Core Phase 1</li> <li>• Completion of non-Band 14 public safety user migration Phase 2</li> </ul>				
E.	<b>Business Management (Task Order #3)</b>	<ul style="list-style-type: none"> <li>• Implement CRM, sales, billing, and financials utilizing existing business support systems</li> </ul>	<ul style="list-style-type: none"> <li>• Complete CRM, sales, billing, and financial business support systems specific to FirstNet</li> </ul>	<ul style="list-style-type: none"> <li>• Evolution of business support systems to meet growth and feature enhancements</li> </ul>			<ul style="list-style-type: none"> <li>• Completion of business support systems deployment and operational milestones</li> </ul>
<b>STATE MILESTONES</b>							
F.	<b>Public Safety Device Connections</b>			<ul style="list-style-type: none"> <li>• Achievement of 50% of Contractor’s IOC-5 public safety device connections target</li> </ul>		<ul style="list-style-type: none"> <li>• Achievement of 100% of Contractor’s public safety device connections target</li> </ul>	

Timing/Area		IOC-1 6 months from award	IOC-2 12 months	IOC-3 24 months	IOC-4 36 months	IOC-5 48 months	FOC 60 months
<b>G.</b>	<b>Coverage and Capacity Solutions (State and Territory Task Orders)</b>		<ul style="list-style-type: none"> <li>Achievement of 20% of Contractor’s proposed Band 14 coverage in non-rural areas</li> </ul>	<ul style="list-style-type: none"> <li>Achievement of 60% of Contractor’s proposed Band 14 coverage in non-rural areas</li> </ul>	<ul style="list-style-type: none"> <li>Achievement of 80% of Contractor’s proposed Band 14 coverage in non-rural areas</li> </ul>	<ul style="list-style-type: none"> <li>Achievement of 95% of Contractor’s proposed Band 14 coverage in non-rural areas</li> </ul>	<ul style="list-style-type: none"> <li>Achievement of 100% of Contractor’s proposed Band 14 coverage in non-rural areas</li> </ul>
<b>H.</b>	<b>Substantial Rural Milestones (State and Territory Task Orders)</b>		<ul style="list-style-type: none"> <li>Achievement of 20% of Contractor’s proposed Band 14 coverage in rural areas</li> </ul>	<ul style="list-style-type: none"> <li>Achievement of 60% of Contractor’s proposed Band 14 coverage in rural areas</li> </ul>	<ul style="list-style-type: none"> <li>Achievement of 80% of Contractor’s proposed Band 14 coverage in rural areas</li> </ul>	<ul style="list-style-type: none"> <li>Achievement of 95% of Contractor’s proposed Band 14 coverage in rural areas</li> </ul>	<ul style="list-style-type: none"> <li>Achievement of 100% of Contractor’s proposed Band 14 coverage in rural areas</li> </ul>

## 3 Timeline Details

### 3.1 IOC-1

IOC-1 is targeted to occur within the first six (6) months post contract award. The initial launch of the NPSBN may use existing wireless services branded as “FirstNet,” similar to a Mobile Virtual Network Operator (MVNO) implementation. These milestones are targeted to align with the availability and implementation of 3GPP releases.

The NPSBN features and functions that are targeted to be available during this phase follow.

#### 3.1.1 IOC-1 – State Plans and Delivery Mechanism

IOC-1 includes the development of state plans as well as an online tool for their delivery.

1. **Launch the Delivery Mechanism for State Plans (Task Order #1)** – Web interface tool to deliver state plans for each of the 56 states and territories
2. **Complete and Issue All State Plans (Task Order #2)**

#### 3.1.2 IOC-1 – Coverage and Capacity Solutions (State and Territory Task Orders)

Coverage and capacity solutions for IOC-1 should provide nationwide coverage through existing wireless service (e.g., MVNO non-Band 14) deployments. Band 14 deployable units and range extension technologies are required to address possible coverage deficiencies and public safety emergencies. The following coverage solutions shall be tested before deployment:

1. Nationwide coverage using currently available wireless services
2. Vehicular Network Systems (VNSs), formerly called the Mobile Communications Units or MCUs
  - a. Testing should ensure general availability of VNSs are certified for performance and reliability and ready for deployment.
  - b. Installation instructions and collateral shall be provided to certified installation vendors.
3. Available Band 14 deployable units, including VNSs
4. Range extension services (e.g., satellite services, high-power User Equipment support)
5. Band 14 laboratory trials shall be conducted for products and services unique to public safety.

#### 3.1.3 IOC-1 – Products and Architecture

Products and architecture for IOC-1 cover all services, applications, devices, architecture and infrastructure, and operations required to meet initial FirstNet non-Band 14 coverage objectives. During this phase, the Contractor shall initiate NPSBN implementation to prepare for integration with state-deployed Radio Access Network (RAN) systems and new site builds.

##### 3.1.3.1 Services

Services for IOC-1 cover all FirstNet network services and enabler milestones required to meet initial non-Band 14 coverage objectives. During this phase, the Contractor shall complete the services and enablers of the Core in preparation for integration with state-deployed RANs and new site builds. Specific milestones include the following:

1. **Complete Data and Voice Services Phase 1**
  - a. Long Term Evolution (LTE)/4G consumer grade data in all coverage areas
  - b. LTE/4G consumer video service in all coverage areas
  - c. LTE/4G consumer grade messaging in all coverage areas
  - d. LTE consumer grade Voice over LTE (VoLTE) and voice in all coverage areas
  - e. Voice fall back to commercial voice services where VoLTE is unavailable
  - f. Consumer grade streaming video in all coverage areas
  - g. Roaming to other commercial networks using the Contractor’s network roaming agreements in areas where FirstNet coverage is unavailable. All services are available on roaming network
  - h. Basic location-based service support in all coverage areas
  - i. Wireless Emergency Alerts (WEA) in all coverage areas
  - j. Lawful Interception (LI) in all coverage areas
  - k. Phase II 9-1-1 services in all coverage areas
2. **Complete Quality of Service, Priority, and Preemption (QPP) Phase 1 (Framework)**
  - a. Use of LTE prioritization capabilities to define public safety QPP profiles
  - b. QPP framework that provides interoperability to ensure end-to-end priority capabilities across network partner(s) and Band 14
  - c. End-to-end priority for public safety users
  - d. Priority treatment for roaming public safety users
  - e. Overload control or other mechanisms to ensure end-to-end priority for public safety users even when the network experiences congestion
  - f. End-to-end Quality of Service (QoS) integrity and interworking with mobile Virtual Private Network (mVPN) solutions employed by Public Safety Enterprise Networks (PSENs).
3. **Complete Identity, Credential, and Access Management (ICAM) Phase 1**
  - a. ICAM interoperability defined
  - b. User attribute interoperability definition for Attribute-Based Access Control (ABAC)
  - c. Onboarding of early adopter public safety agencies into ICAM trust framework
  - d. Agency identity proofing process defined and implemented
  - e. Hosted identity solution for public safety agencies that choose not to implement their own identity provider for user authentication
  - f. Federated identity management for early adopters leveraging the defined ICAM trust framework
  - g. Single Sign-On (SSO) for mobile devices

### 3.1.3.2 Applications

During IOC-1, the Contractor shall implement and deploy an applications ecosystem that consists of a FirstNet applications store featuring applications specific to public safety, hosted cloud services, an application developer’s ecosystem, and a Service Delivery Platform and associated Application Programming Interfaces (APIs), as defined in the architecture, design, and implementation plans. The Contractor shall define the processes and procedures for public safety agencies and third parties to use the applications ecosystem and for public safety agencies and developers to use the application developer’s ecosystem to produce certified Public Safety Grade applications. Specific milestones include the following:

1. **Complete Applications Ecosystem Phase 1**
  - a. FirstNet applications store for public safety applications
  - b. Certified public safety applications available to public safety users from both the FirstNet applications store and commercial applications stores
  - c. Hosted cloud services offered to public safety agencies and application developers, including Infrastructure as a Service (IaaS), Software as a Service (SaaS), and Platform as a Service (PaaS)
  - d. User, data, and service analytics and analytic services/APIs
  - e. Application's developer ecosystem, including developer Web page, Mobile Application Development Platform (MADP), software developer kits (SDKs), and developers' tools
  - f. Application and developer certification process and requirements defined
  - g. Application certification environment available
  - h. Service Delivery Platform framework integration for FirstNet that includes middleware and back-end network services integration
  - i. APIs and SDKs available for federated ICAM, including securely accessing local, state, regional, tribal, and federal databases and resources
  - j. APIs and SDKs available for delivered network services
  - k. APIs and SDKs available for SSO on mobile devices
2. **Complete Local Control Application Phase 1**
  - a. Agency local control administration and management application utilizing existing online systems
  - b. Agencies able to manage agency accounts and subscriptions
  - c. Agencies able to manage users, groups, and basic profiles
  - d. Agencies able to manage devices and basic profiles
  - e. Agencies able to manage applications
3. **Complete Public Safety Entity (PSE) Home Page**
  - a. PSE home page available for public safety agency adoption
  - b. Status of the NPSBN
  - c. Situational awareness and incident information for agencies
  - d. Support for local agency customization

### 3.1.3.3 Devices

The Contractor shall develop and provide a suitable portfolio, roadmap, and device approval process for devices made available to public safety users. Devices shall comprise commercial off-the-shelf (COTS) non-Band 14 and Band 14 enabled devices, accessories, machine-to-machine (M2M), and other specialized devices. The Contractor shall establish processes and procedures to allow an agency to deploy a Bring-Your-Own-Device (BYOD) approach on the network. Specific milestones include the following:

1. **Complete Devices Phase 1**
  - a. Portfolio of COTS non-Band 14 devices suitable for public safety users and devices that can be used as BYOD to access public safety applications
  - b. Portfolio and roadmap of available and planned Band 14 devices, including the following:
    - i. Portables (i.e., smartphones, tablets, and modems)
    - ii. In-vehicle routers

- iii. Specialized devices (e.g., ruggedized, high-power, dual mode LTE/Land Mobile Radio [LMR])
- iv. M2M
- v. Accessories (e.g., rugged cases, battery packs, headsets)
- c. FirstNet device approval process and Device Independent Verification and Validation (DIV&V) tests
- d. FirstNet Universal Integrated Circuit Card (UICC) profile and common embedded applications (e.g., enablers for computer-aided dispatch, mapping, virtual assistant and voice control clients, securing devices)

#### 3.1.3.4 Architecture and Infrastructure

Architecture and infrastructure for IOC-1 covers all Core related milestones required to meet initial FirstNet coverage objectives. During this phase, the Contractor shall commence building of the Core to prepare for integration with state-deployed RANs and new site builds, as defined in the architecture, design, and implementation plans. Specific milestones include the following:

1. **Complete Core Infrastructure Phase 1**
  - a. Core systems that support non-Band 14 services are completed and ready for service, including Core Evolved Packet Core (EPC), service provisioning, and management
  - b. Operational and acceptance testing of associated non-Band 14 Core systems, services, and equipment to ensure the implementation plan and RAN coverage objectives are met
  - c. Begin implementation of dedicated FirstNet Core and associated subsystems.
2. **Complete Infrastructure Hardening Phase 1**
  - a. Completed planned Core hardening, including:
    - i. EPC hardening
    - ii. Transmission systems hardening
    - iii. Operational support system (OSS) hardening
    - iv. Business support system (BSS) hardening
3. **Complete Security Phase 1**
  - a. Basic security services provided, including:
    - i. Over-the-air authentication, encryption, and integrity protection
    - ii. Data management from a device and ability to disable the device in case of a security breach
    - iii. Secure connections between eNodeBs and the Core with the ability to pass mVPN services and interwork with LTE Grade Of Service (GOS)
    - iv. Firewalls and intrusion protection services to secure traffic between the Core network and external networks, creating a trusted network infrastructure
  - b. Complete implementation of subscriber database management for security and management
  - c. Support for the transport of secure data services in conjunction with application-level Transport Socket Layer (TSL) and other device-to-application security connection methods
  - d. Launch of network monitoring and security event tracking

### 3.1.3.5 Operations

Operations for IOC-1 cover all network operations milestones required to meet initial FirstNet coverage objectives. During this phase, the Contractor shall initiate building of the Core to prepare for state-deployed RANs and new site builds. Specific milestones include the following:

1. **Commence Non-Band 14 Network Operations**
  - a. Network operations processes and procedures are implemented and support organizations are in place and fully resourced, operational, and able to monitor non-Band 14 system(s)
  - b. Fully operational Services Management Center (SMC) that can monitor non-Band 14 systems
  - c. Performance metrics tracked, monitored, corrected, and reported
  - d. OSS connected and synchronized with local control system to provide network statistics and performance of non-Band 14 system(s)
  - e. Public safety Open Mobile Alliance Device Management (OMA-DM) policies and OMA-DM for non-Band 14 service provisioning
2. **Launch Agency Systems Onboarding**
  - a. Integrated device ordering and provisioning systems with FirstNet-branded, customer-facing Web portal
  - b. Operational device distribution channels
  - c. Packaging specification for device types provided to distributors
  - d. Integrated partner solution with local agency asset systems
3. **Complete PSEN Onboarding and Interconnection Phase 1**
  - a. Implementation plan for integrating each PSEN into the NPSBN, which includes methods, milestones, and a timeline to establish PSEN point-of-presence locations; implement PSEN connectivity and interfaces with the Emergency Services IP network (ESInet); assign APNs; and interconnect with computer-aided dispatch, dispatch, Public Safety Answering Points, and NG911 systems.
4. **Complete Non-Band 14 Public Safety User Migration Phase 1**
  - a. Public safety user migration from existing wireless systems to the Core network and systems.

### 3.1.4 IOC-1 – Business Management

The Contractor shall implement initial business management services using Contractor-provided BSS.

1. **Implement Customer Relationship Management (CRM), Sales, Billing, and Financials Utilizing Existing Business Support Systems**
  - a. Business support systems for sales planning, sales forecasting, monitoring, tracking and compliance, sales operations, sales training, and compensation
  - b. Business support systems for billing, account management, asset tracking, and financials

## 3.2 IOC-2

IOC-2 is targeted to occur within one (1) year post contract award. In addition to the features and functionalities targeted to be available at the launch of the NPSBN, the following features and functionalities are targeted to be available.

### 3.2.1 IOC-2 – Coverage and Capacity Solutions

Deployment of Band 14 coverage solutions for both rural and non-rural areas begins in IOC-2.

1. **Non-rural coverage milestone met** (as noted in Table 1 IOC/FOC Milestones above)
2. **Rural coverage milestone met** (as noted in Table 1 IOC/FOC Milestones above)

### 3.2.2 IOC-2 – Products and Architecture

Products and architecture for IOC-2 cover all services, applications, devices, architecture and infrastructure, and operations required to meet initial FirstNet coverage objectives. During this phase, the Contractor shall prepare the NPSBN and for integration with state-deployed RANs and new site builds.

#### 3.2.2.1 Services

Services for IOC-2 cover all FirstNet network services and enabler milestones required to meet initial FirstNet coverage objectives. During this phase, the Contractor shall complete the services and enablers of the Core in preparation for integration with state-deployed RANs and new site builds. Specific milestones include the following:

1. **Complete Data and Voice Services Phase 2**
  - a. Data on Band 14 deployments and interworking with non-Band 14 systems and services
  - b. Video service and messaging on Band 14 deployments and interworking with non-Band 14 systems and services
  - c. VoLTE on Band 14 deployments and interworking with non-Band 14 systems and services
  - d. Multicast video
  - e. Consumer-grade Push-to-Talk (PTT)
  - f. Begin FirstNet location-based services
  - g. FirstNet WEA
  - h. FirstNet LI
  - i. FirstNet 9-1-1
  - j. FirstNet Evolved Multimedia Broadcast Multicast Service (eMBMS)
2. **Complete QPP Phase 2 (Static QPP)**
  - a. FirstNet QPP framework for voice, video, guaranteed bit rate (GBR) data, and non-GBR data services in Band 14
  - b. System to check user credentials for priority services and map users to their default QPP profiles
  - c. Defined QPP framework for Band 14 that interoperates and aligns with the Contractor's network priority services
  - d. Pre-emption profiles and interoperability with priority settings
3. **Complete ICAM Phase 2**
  - a. Enhancements to FirstNet trust framework (ICAM, user attribute definitions, and new capabilities)
  - b. Onboarding of PSEs
  - c. General availability of federated access for participating agencies to local, state, regional, tribal, and federal applications, services, databases, and resources
  - d. ICAM solution in all Contractor-provided applications

### 3.2.2.2 Applications

The Contractor shall enhance the applications ecosystem and application developer's ecosystem to incorporate new network services, APIs and SDKs, innovations, and general updates, including local control updates for static QPP. Specific milestones include the following:

1. **Complete Applications Ecosystem Phase 2**
  - a. APIs and SDKs available for interacting with static QPP network service
  - b. APIs and SDKs available for new network services
  - c. Enhancements to Service Delivery Platform, application developer's ecosystem, FirstNet applications store, and cloud services
2. **Complete Public Safety Applications Phase 1**
  - a. Third-party applications leveraging static QPP APIs
  - b. Applications evolution and continuous delivery based on public safety feedback, needs, and technology innovations
3. **Complete Local Control Application Phase 2**
  - a. Ability to control/manage static QPP via local control
  - b. Public Safety Enterprise (PSE) home page application evolution and continuous delivery

### 3.2.2.3 Devices

The Contractor shall update the portfolio of devices for public safety with new devices from Original Equipment Manufacturers (OEMs) that are suitable for the NPSBN and aligned with agencies' expectations. Upon publication of 3GPP release 12, the Contractor shall provide updated software-related packaging details to distributor(s) of all affected device types, features, and embedded applications. In addition, the Contractor shall provide software and firmware update release schedules in accordance with network software updates. Specific milestones include the following:

1. **Complete Devices Phase 2**
  - a. Portfolio of Band 14 devices across all categories
  - b. Devices certified for safety through FirstNet DIV&V testing

### 3.2.2.4 Architecture and Infrastructure

Architecture and infrastructure for IOC-2 covers all Core milestones required to meet FirstNet coverage objectives. During this phase, the Contractor shall finish building the Core to prepare for integration with state-deployed RANs and new site builds. Specific milestones include the following:

1. **Complete Core Infrastructure Phase 2**
  - a. Core is online and in use
  - b. Equipment orders, deliveries, deployments, and operational acceptance for the Core services and resources to meet the implementation plan delivery milestones to ensure RAN coverage objectives are met
  - c. Implementation of architected Core to ensure the network is ready for acceptance and integration with state-deployed RANs and new build sites
    - i. On-Network QoS (infrastructure and device) on Band 14 deployments and interworking with non-Band 14 systems
    - ii. Inclusion of Mobile Management Entity (MME), Serving Gateway/Packet Data Network Gateway (S/PGW), Home Subscriber Server (HSS), Policy and

- Changing Rules Function (PCRF), IP Multimedia Subsystem, Session Description Protocol, Diameter Routing Agent (DRA), OSS, BSS, routers, switches, firewalls, transmission systems, Domain Name System (DNS), Dynamic Host Configuration Protocol (DHSCP), and Intrusion Detection System (IDS) in Core systems
- iii. Contractor’s 3G network interworking with Band 14 coverage
2. **Complete Infrastructure Hardening Phase 2**
    - a. Core hardening, including for state-deployed RANs and new site builds
      - i. Core redundancy and failover to meet availability objectives
      - ii. Geo-redundancy and failover to meet availability objectives
      - iii. Geo-diverse transport to meet availability objectives
  3. **Complete Security Phase 2**
    - a. Security mechanisms for the applications ecosystem
      - i. Consistency checks to mitigate spoofing of applications to devices
      - ii. Integrity validation to ensure legitimacy of downloads
    - b. Enhanced monitoring of network traffic and security events
      - i. Band 14 sites
      - ii. Non-Band 14 sites
      - iii. Applications

### 3.2.2.5 Operations

Operations for IOC-2 cover all network operations milestones required to meet ongoing FirstNet coverage objectives. During this phase, the Contractor shall complete and perform acceptance testing for the Core and for new site builds. Specific milestones include the following:

1. **Commence Band 14 Operations**
  - a. OMA-DM for Band 14 service provisioning
2. **Commence FirstNet Operational SMC**
  - a. Methods and procedures for all operational activities, resources, and structures (e.g., change management)
  - b. Active, support systems that are populated with appropriate data and work flows
  - c. Operational resources and structures
3. **Commence FirstNet Operations**
  - a. Methods and procedures for all operational activities, resources, and structures (e.g., change management)
  - b. Active, operational support systems that are populated with appropriate data and workflows
  - c. Operational resources and structures
4. **Complete PSEN Onboarding and Interconnection Phase 2**
  - a. Integrate additional PSEN sites based PSEN onboarding implementation plan.
  - b. Accommodation of Over-the-Top (OTT)-based PTT until standards-based Mission Critical (MC)-PTT is available.
  - c. Tested and verified end-to-end bearer encryption and local use of mVPN solutions interworking in conjunction with FirstNet QoS
5. **Complete Radio Frequency (RF) Site Integration to Core Phase 1**
  - a. Completed RF site integration and on-air acceptance tests

- b. Transfer to operations for associated state-deployed RANs, Band 14 and non-Band 14 RANs, services, and equipment
6. **Complete Non-Band 14 Public Safety User Migration Phase 2**
  - a. Migration of public safety users from existing wireless systems to the FirstNet Core and systems

### 3.2.3 IOC-2 – Business Management

The Contractor shall establish business management systems and services specifically for the NPSBN, including CRM, sales, billing, and financial systems.

1. **Complete CRM, Sales, Billing and Financial Business Support Systems Specific to FirstNet**
  - a. CRM systems and tools to support marketing, help desk, point of sale of FirstNet devices, services, and reporting on Key Performance Indicators
  - b. Form and functionality of a FirstNet-branded customer-facing Web portal that allows agencies to view and order devices, service offerings, and accessories
  - c. BSS for sales planning; sales forecasting, monitoring, tracking, and compliance; sales operations; sales training; and compensation.
  - d. BSS for billing, account management, asset tracking, and financials

## 3.3 IOC-3

IOC-3 is targeted to occur within two (2) years post contract award. In addition to the features and functionalities targeted to be available at IOC-2, the following features and functionalities are targeted to be available.

### 3.3.1 IOC-3 – Coverage and Capacity Solutions

IOC-3 coverage solutions significantly expand non-rural and rural Band 14 coverage.

1. **Non-rural coverage milestone met** (as noted in Table 1 IOC/FOC Milestones above)
2. **Rural coverage milestone met** (as noted in Table 1 IOC/FOC Milestones above)

### 3.3.2 IOC-3 – Products and Architecture

Products and architecture for IOC-3 cover all services, applications, devices, architecture and infrastructure, and operations required to meet FirstNet coverage objectives. During this phase, the Contractor shall complete the NPSBN and prepare for integration with state-deployed RANs and new site builds.

#### 3.3.2.1 Services

Services for IOC-3 cover all FirstNet network services and enabler milestones required to meet FirstNet coverage objectives. During this phase, the Contractor shall complete the services and enablers of the Core in preparation for integration with state-deployed RANs and new site builds as defined in the architecture, design, and implementation plans. Specific milestones include the following:

1. **Complete Mission-Critical Services, Systems, and Operations Phase 1**
  - a. Enhanced messaging
  - b. Enhanced Band 14 LTE Public Safety Grade VoLTE
  - c. MC-PTT
  - d. Multi-cast service (eMBMS)
  - e. Multi-cast WEA

- f. Group Communication System Enablers (GCSE)
- g. Proximity Services (ProSe)
- 2. **Complete QPP Phase 3 (Dynamic QPP)**
  - a. Ability to invoke emergency priority treatment for public safety users
  - b. Configured NPSBN elements that support dynamic QPP on Band 14, including pre-emption

### 3.3.2.2 Applications

The Contractor shall update the applications ecosystem, local control application, PSE home page, and default applications. Specific milestones include the following:

1. **Complete Application Ecosystem Phase 3**
  - a. Steady stream of new third-party public safety applications being developed, certified, and published to the FirstNet applications store
  - b. APIs and SDKs available for interacting with dynamic QPP network service
  - c. APIs and SDKs available for newly delivered network services
  - d. Continued enhancements to Service Delivery Platform, application developer's ecosystem, FirstNet applications store, and cloud services
2. **Complete Public Safety Applications Phase 2**
  - a. Third-party applications that leverage dynamic QPP APIs
  - b. Applications evolution and continuous delivery based on public safety needs, feedback, and technology innovations
3. **Complete Local Control Application Phase 3**
  - a. Local control systems that support dynamic QPP
  - b. Ability to control/manage dynamic QPP via local control
  - c. PSE home page application evolution and continuous delivery based on public safety needs, feedback, and technology innovations

### 3.3.2.3 Devices

The Contractor shall update the portfolio of devices for public safety with new devices from OEMs that are suitable for the NPSBN and align with agencies' expectations. Upon publication of 3GPP release 13, the Contractor shall test, validate, and release new public safety features, including MC services, for general availability across the NPSBN. The Contractor shall make virtual assistant services unique to public safety generally available; these services shall include discipline-specific languages and commands and utilize segregated (non-commercial) servers and storage. The Contractor shall provide software and firmware update release schedules in accordance with network software updates. Specific milestones include the following:

1. **Complete Devices Phase 3**
  - a. **Band 14 Device Portfolio Available** – Make additional Band 14 enabled devices available across all categories to PSEs.
  - b. **Devices are safe for network** as deemed by FirstNet's DIV&V testing.

### 3.3.2.4 Architecture and Infrastructure

Architecture and infrastructure for IOC-3 covers all Core milestones required to meet FirstNet coverage objectives. During this phase, the Contractor shall complete additions to the Core to prepare for integration with state-deployed RANs and new site builds. Specific milestones include the following:

1. **Complete Core Infrastructure Phase 3**
  - a. Core additions for state-deployed RANs
  - b. Core additions based on the overall coverage design objectives
2. Equipment orders, deliveries, deployments, and operational acceptance for the Core services and resources to meet the implementation plan delivery milestones to ensure RAN coverage objectives are met
3. **Complete Infrastructure Hardening Phase 3**
  - a. Additions to Core hardening, including for state-deployed RANs
    - i. Core redundancy and failover to meet availability objectives
    - ii. Geo-redundancy and failover to meet availability objectives
    - iii. Geo-diverse transport to meet availability objectives
4. **Complete Security Phase 3**
  - a. Additional security services for deployable units
  - b. Updated security services for the applications ecosystem
  - c. Continuous improvement of monitoring of network traffic, tracking, and response for security events

### 3.3.2.5 Operations

Operations for IOC-3 cover all network operations milestones required to meet ongoing FirstNet coverage objectives. During this phase, the Contractor shall complete final acceptance of the Core to prepare for integration with state-deployed RANs, complete final acceptance of new site builds, and PSEN onboarding activities. Specific milestones include the following:

1. **Complete PSEN Onboarding and Interconnection Phase 3**
  - a. Integrate additional PSEN sites based PSEN onboarding implementation plan
  - b. Support for NG911 systems
2. **Complete RF Site Integration to Core Phase 2**
  - a. Completed RF site integration and on-air acceptance tests
  - b. Transfer of associated state-deployed, Band 14, and non-Band 14 RANs to operations to meet coverage objectives

### 3.3.3 IOC-3 – Business Management

The Contractor shall enhance the NPSBN’s BSS, including the CRM system and customer-facing Web portal, to scale and add features.

### 3.3.4 IOC-3 – State Public Safety Device Connections

The Contractor shall meet 50 percent of the IOC-5 public safety device connections target.

## 3.4 IOC-4

IOC-4 is targeted to occur within three (3) years post contract award. In addition to the features and functionalities targeted to be available at IOC-3, the following features and functionalities are targeted to be available.

### 3.4.1 IOC-4 – Coverage and Capacity Solutions

IOC-4 coverage solutions shall continue to expand non-rural and rural Band 14 coverage.

1. **Non-rural coverage milestone met** (as noted in Table 1 IOC/FOC Milestones above)
2. **Rural coverage milestone met** (as noted in Table 1 IOC/FOC Milestones above)

### 3.4.2 IOC-4 – Products and Architecture

Products and architecture for IOC-4 cover all services, applications, devices, architecture and infrastructure, and operations required to meet ongoing FirstNet coverage objectives. During this phase, the Contractor shall complete the NPSBN and prepare for integration with state-deployed RANs and new site builds.

#### 3.4.2.1 Services

Services for IOC-3 cover all FirstNet network services and enabler milestones required to meet FirstNet coverage objectives. During this phase, the Contractor shall complete the services and enablers of the Core in preparation for integration with state-deployed RANs and new site builds. Specific milestones include the following:

1. **Complete Mission-Critical Services, Systems, and Operations Phase 2**
  - a. MC-PTT enhancements
  - b. GCSE enhancements and Single-Cell Point-to-Multipoint (SC-PTM)
  - c. ProSe enhancements
  - d. MC-Video
2. **Complete Location-Based Service Enhancements**

#### 3.4.2.2 Applications

The Contractor shall update the applications ecosystem, local control application, and PSE home page. The application developer's ecosystem shall include updates to SDKs and APIs for newly provided network services.

#### 3.4.2.3 Devices

The Contractor shall update the device roadmap with new public safety related devices from OEMs that are suitable for the NPSBN and align with agencies' expectations. Upon publication of 3GPP release 13, the Contractor shall provide updated software related packaging details to distributor(s) of all effected device types. The Contractor shall provide software and firmware update release schedules in accordance with network software updates.

#### 3.4.2.4 Architecture and Infrastructure

Architecture and infrastructure for IOC-4 covers all Core milestones required to meet ongoing FirstNet coverage objectives. During this phase, the Contractor shall complete additions to the Core to prepare for integration with state-deployed RANs and new site builds. Specific milestones include the following:

1. **Complete Core Infrastructure Phase 4**
  - a. Core additions for state-deployed RANs
  - b. Core additions based on the overall coverage design objectives
2. Equipment orders, deliveries, deployments, and operational acceptance for the Core services and resources to meet the implementation plan delivery milestones to ensure RAN coverage objectives are met
3. **Complete Infrastructure Hardening Phase 4**
  - a. Core hardening additions for state-deployed RAN systems
    - i. Core redundancy and failover to meet availability objectives
    - ii. Geo-redundancy and failover to meet availability objectives
    - iii. Geo-diverse transport to meet availability objectives

#### 4. Complete Security Phase 4

- a. Reviewed and updated security services to reflect technology and threat changes
- b. Security updates according to 3GPP release schedule

#### 3.4.2.5 Operations

Operations for IOC-4 cover all network operations milestones required to meet ongoing FirstNet coverage objectives. During this phase, the Contractor shall complete the integration of state-deployed RANs and new site builds and perform acceptance testing and continue with PSEN onboarding activities. Specific milestones include the following:

1. **Complete PSEN Onboarding and Interconnection Phase 4**
  - a. Integrate additional PSEN sites based PSEN onboarding implementation plan
2. **Complete RF Site Integration to Core Phase 3**
  - a. Completed RF site integrations and on-air acceptance tests
  - b. Transfer of associated state-deployed, Band 14, and non-Band 14 RANs to operations to meet coverage objectives

#### 3.4.3 IOC-4 – Business Management

The Contractor shall enhance the NPSBN’s BSS, including the CRM system and customer-facing Web portal, to scale and add features.

### 3.5 IOC-5

IOC-5 is targeted to occur within four (4) years post contract award. In addition to the features and functionalities targeted to be available at IOC-4, the following features and functionalities are targeted to be available:

#### 3.5.1 IOC-5 – Coverage and Capacity Solutions

IOC-5 coverage solutions shall continue to expand non-rural and rural Band 14 coverage, including coverage for all major highways.

1. **Non-rural coverage milestone met** (as noted in Table 1 IOC/FOC Milestones above)
2. **Rural coverage milestone met** (as noted in Table 1 IOC/FOC Milestones above)

#### 3.5.2 IOC-5 – Products and Architecture

Products and architecture for IOC-5 cover all services, applications, devices, architecture and infrastructure, and operations required to meet ongoing FirstNet coverage objectives. During this phase, the Contractor shall complete the NPSBN and prepare for integration with state-deployed RANs and new site builds.

##### 3.5.2.1 Services

Services for IOC-5 cover all FirstNet network services and enabler milestones required to meet FirstNet coverage objectives. During this phase, the Contractor shall complete the services and enablers of the Core in preparation for integration with state-deployed RANs and new site builds. Specific milestones include the following:

1. **Complete Mission-Critical Services, Systems, and Operations Phase 3**
  - a. MC video and data
  - b. MC-PTT enhancements

- c. Enhanced group communications
- d. Enhanced ProSe
- e. Enhanced location capabilities for indoor and outdoor emergency communications

### 3.5.2.2 Applications

The Contractor shall update the applications ecosystem, local control application, and PSE home page. Updates to the application developer's ecosystem shall include SDKs and APIs for newly provided network services.

### 3.5.2.3 Devices

The Contractor shall update the portfolio roadmap for public safety with new devices from OEMs that are suitable for the NPSBN and align with agencies' expectations. The Contractor shall test, validate, certify, and release public safety features of 3GPP release 14—including MC-video and data—for general availability across the NPSBN. The Contractor shall provide software and firmware update release schedules in accordance with network software updates.

### 3.5.2.4 Architecture and Infrastructure

Architecture and infrastructure for IOC-5 covers all Core milestones required to meet initial FirstNet coverage objectives. During this phase, the Contractor shall complete additions to the Core to prepare for integration with state-deployed RANs and new site builds. Specific milestones include the following:

1. **Complete Core Infrastructure Phase 5**
  - a. Core additions for state-deployed RANs
  - b. Core additions based on the overall coverage design objectives
2. Equipment orders, deliveries, deployments, and operational acceptance for the Core services and resources to meet the implementation plan delivery milestones to ensure RAN coverage objectives are met
3. **Complete Infrastructure Hardening Phase 5**
  - a. Core hardening additions for state-deployed RAN systems and growth
    - i. Core redundancy and failover to meet availability objectives
    - ii. Geo-redundancy and failover to meet availability objectives
    - iii. Geo-diverse transport to meet availability objectives
4. **Complete Security Phase 5**
  - a. Reviewed and updated existing security services to reflect technology and threat changes
  - b. Security updates according to the 3GPP release schedule

### 3.5.2.5 Operations

Operations for IOC-5 cover all network operations milestones required to meet ongoing FirstNet coverage objectives. During this phase, the Contractor shall complete and perform acceptance testing efforts to integrate state-deployed RANs and new site builds, and conduct PSEN onboarding activities. Specific milestones include the following:

1. **Complete PSEN Onboarding and Interconnection Phase 5**
  - a. Integrate additional PSEN sites based PSEN onboarding implementation plan
2. **Complete RF site integration to Core Phase 4**
  - a. Completed RF site integrations and on-air acceptance tests

- b. Transfer of associated state-deployed, Band 14, and non-Band 14 RANs to operations RANs to meet coverage objectives

### 3.5.3 IOC-5 – Business Management

The Contractor shall enhance the NPSBN’s BSS, including the CRM system and customer-facing Web portal, to scale and add features.

### 3.5.4 IOC-5 – State Public Safety Device Connections

The Contractor shall meet 100 percent of the IOC-5 public safety device connections target.

## 3.6 FOC

FOC is targeted to occur within five (5) years post contract award to include the delivery of all milestones, services, systems, and hardening.

### 3.6.1 FOC – Coverage and Capacity Solutions

FOC for coverage and capacity solutions includes all milestones related to non-Band 14 and Band 14 for rural and non-rural areas that were agreed upon and approved to meet FOC objectives.

1. **All non-rural coverage milestones met** (as noted in Table 1 IOC/FOC Milestones above)
2. **All rural coverage milestones met** (as noted in Table 1 IOC/FOC Milestones above)

### 3.6.2 FOC – Products and Architecture

FOC for products and architecture identifies the point where all IOC objectives are met to create the initial fully functional NPSBN, which provides all the services, applications, devices, architecture and infrastructure, and operations that first responders need.

#### 3.6.2.1 Services

FOC for services includes all deliverables and milestones related to services and service enablers.

1. The Contractor shall deliver all IOC services milestones to meet FOC objectives.
2. The Contractor shall meet roadmap development milestones and objectives.

#### 3.6.2.2 Applications

FOC for applications includes all deliverables and milestones related to applications.

1. The Contractor shall deliver all IOC applications milestones to meet FOC objectives.
2. The Contractor shall meet roadmap development milestones and objectives.

#### 3.6.2.3 Devices

FOC for devices includes all deliverables and milestones related to devices.

1. The Contractor shall deliver all IOC device milestones to meet FOC objectives.
2. The Contractor shall continue to evolve the devices portfolio based on approved and agreed upon roadmaps.

#### 3.6.2.4 Architecture and Infrastructure

FOC for architecture and infrastructure includes all deliverables and milestones related to architecture, as well as all infrastructure implementation, system delivery, turn up, and acceptance of systems.

1. The Contractor shall deliver all IOC architecture and infrastructure milestones to meet FOC objectives.
2. The Contractor shall meet roadmap development milestones and objectives.

### 3.6.2.5 Operations

FOC for deliverables and milestones related to operations, including the integration of PSEs, state-deployed RANs, and new build sites. This also establishes all ongoing objectives conformance as well as new quality improvement objectives.

1. The Contractor shall deliver all IOC operations milestones to meet FOC objectives.
2. The Contractor shall meet roadmap development milestones and objectives.
3. The Contractor shall meet PSEN integration objectives.
4. The Contractor shall meet objectives related to RF site integrations to the Core.
5. The Contractor shall meet operational objectives.

### 3.6.3 FOC – Business Management

FOC for business management includes the deployment of all BSS—such as sales, customer care, and financial sustainability—that were agreed upon and approved to meet FOC objectives.

1. The Contractor shall meet milestones related to BSS deployment and operations.

## 4 Additional Features

Beyond the features and functions targeted within this timeline, FirstNet intends for the coverage, services, system, and hardening to evolve to meet public safety users' needs while keeping up with new technologies.