



Appendix C-8

IOC / FOC Target Timeline

*Special Notice D15PS00295 – Nationwide Public
Safety Broadband Network (NPSBN)*

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1 Document Overview

This document provides details pertaining to the target Initial Operating Capability / Final Operating Capability (IOC / FOC) timeline for the FirstNet Nationwide Public Safety Broadband Network (NPSBN). This timeline correlates with the 3rd Generation Partnership Project (3GPP) standard body release timeline; the phases of the corresponding NPSBN deployment are referenced herein.

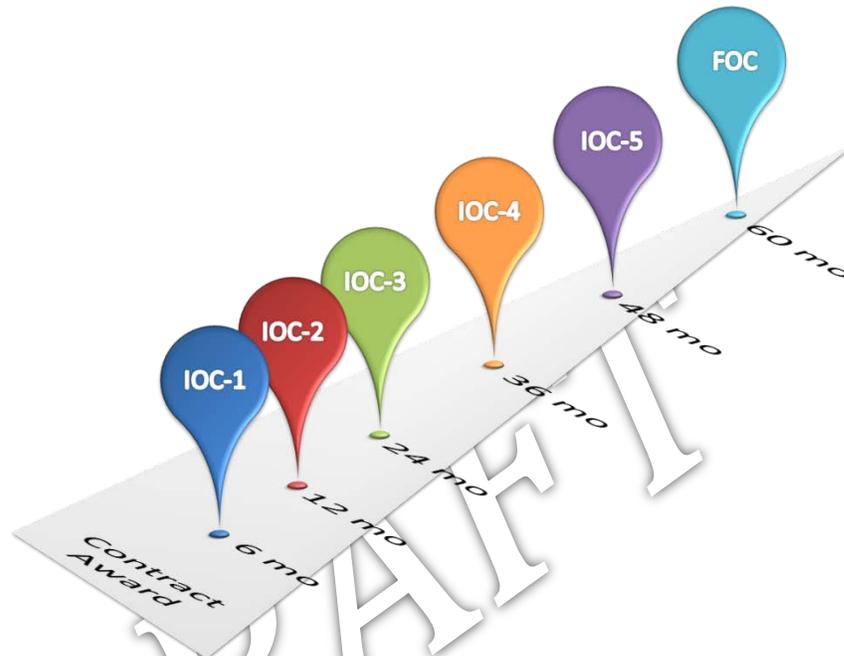


Figure 1 IOC / FOC Timeline

2 High Level IOC Timeline

Figure 1 IOC / FOC Timeline shows the high level target time for the features and functionalities to be available in the NPSBN.

Notes:

- 1) The timing of the features and functions within this timeline could be adjusted per the release and availability of 3GPP releases and its associated features and functionalities.
- 2) The IOC-3 reference to Next Generation 9-1-1 (NG911) should consider Section 4.4.6.3, NG911 Services, from the Federal Communications Commission (FCC) Technical Advisory Board (TAB) report.

Timing / Area ¹	IOC-1 Launch 6 months from award	IOC-2 12 months	IOC-3 24 months	IOC-4 36 months	IOC-5 48 months	FOC 60 months
3GPP Release (See notes in Section 2)	<ul style="list-style-type: none"> Release 12 deployed 	<ul style="list-style-type: none"> Release 13 implemented 	<ul style="list-style-type: none"> Release 13 deployed 	<ul style="list-style-type: none"> Target Release 14 in definition 	<ul style="list-style-type: none"> Target Release 14 implementation 	<ul style="list-style-type: none"> Future release targets
Radio Frequency (RF) Solutions	<ul style="list-style-type: none"> Nationwide Mobile Virtual Network Operator (MVNO) non-Band 14 Band 14 deployables available Existing satellite services as coverage extension Band 14 laboratory tests 	<ul style="list-style-type: none"> Band 14 coverage begins 15% Band 14 coverage objectives met 15% of the substantial rural milestones met 	<ul style="list-style-type: none"> 60% Band 14 coverage objectives met 40% of the substantial rural milestones met 	<ul style="list-style-type: none"> 80% Band 14 coverage objectives met 60% of the substantial rural milestones met 	<ul style="list-style-type: none"> 95% Band 14 coverage objectives met & all major highways covered 80% of the substantial rural milestones met 	<ul style="list-style-type: none"> Band 14 coverage objectives met Substantial rural milestones met
Services <ul style="list-style-type: none"> Devices Apps Core 	<ul style="list-style-type: none"> Commercial Off The Shelf (COTS) non-Band 14 devices Initial Band 14 devices Band 14 device portfolio development Apps store and ecosystem Phase 1 Apps available from FirstNet and commercial app stores Contractor's core Commercially available data and voice services 	<ul style="list-style-type: none"> Band 14 device portfolio available Apps store and ecosystem Phase 2 Steady stream of new public service (PS) apps FirstNet core leveraged 	<ul style="list-style-type: none"> Device to device / Proximity Services (ProSe) Direct mode service App store & ecosystem Phase 3 Access to local, tribal and state apps 	<ul style="list-style-type: none"> Mobile communications unit (MCU) Mission critical services Services evolutions 	<ul style="list-style-type: none"> Continued services evolutions 	<ul style="list-style-type: none"> Contractor(s) delivers all milestones

¹ IOC-FOC milestones are applicable to the NPSBN and do not apply to opt-out states. However, when opt-out states become operational, all aspects of their network shall be commensurate with those stated here in the IOC-FOC timeline.

Timing / Area ¹	IOC-1 Launch 6 months from award	IOC-2 12 months	IOC-3 24 months	IOC-4 36 months	IOC-5 48 months	FOC 60 months
Systems <ul style="list-style-type: none"> • Business/ and Operation Support Systems (B/OSS) • Quality of Service, Priority and Preemption (QPP) • Local Control 	<ul style="list-style-type: none"> • PSEN onboarding and Interconnection • Define QPP framework • Contractors systems • Local control Phase 1 • ICAM Phase 1 	<ul style="list-style-type: none"> • QPP on Band 14 • Local control Phase 2 • ICAM Phase 2 	<ul style="list-style-type: none"> • NG911 (See notes in Section 2) • Multi-cast • Group communication system enablers (GCSE) • Local control Phase 3, dynamic QPP • ICAM Phase 3 	<ul style="list-style-type: none"> • Mission critical systems • Systems evolutions 	<ul style="list-style-type: none"> • Continued systems evolutions 	<ul style="list-style-type: none"> • Contractor(s) delivers all milestones
Hardening and Security	<ul style="list-style-type: none"> • Basic security services 	<ul style="list-style-type: none"> • Enhanced security services • Radio Access Network (RAN) and core hardening Phase 1 	<ul style="list-style-type: none"> • RAN and core hardening Phase 2 	<ul style="list-style-type: none"> • RAN and core hardening Phase 3 	<ul style="list-style-type: none"> • Hardening and security evolutions 	<ul style="list-style-type: none"> • Contractor(s) delivers all milestones

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3 Definitions

These definitions follow the FirstNet proposed interpretations of parts of *The Middle Class Tax Relief and Job Creation Act of 2012*.

- **Non-Rural** – As a city or area that has a population of greater than 20,000 inhabitants.
- **Rural or Rural Area** – As a city, town or incorporated area that has a population of less than 20,000 inhabitants.
- **Substantial Rural Milestone** – At least 20 percent (20%) of total covered area for each Band 14 IOC deployment phase must comprise areas defined as rural (coverage measured in square miles). Band 14 IOC phases are IOC2-5 and FOC.

4 Timeline Details (Phases)

4.1 IOC-1 – Launch

This phase is targeted to begin six (6) months after award. The initial launch of FirstNet may use existing commercial grade and available services. These are the same services that are also available to standard customers but may be branded FirstNet similar to an MVNO implementation. These items are targeted to align with 3GPP releases' availability and implementation. The features and functions that are targeted to be available during this phase are:

4.1.1 IOC-1 – RF Solutions

1. Nationwide MVNO *non*-Band 14 coverage using selected contractor(s) current commercially available nationwide coverage
2. Band 14 deployables available
3. Existing satellite services available as coverage extension
4. Band 14 laboratory trial(s)
5. High Power User Equipment (UE) support

4.1.2 IOC-1 – Services

1. COTS non-Band 14 devices available
2. Initial Band 14 devices available
3. Full Band 14 device portfolio and roadmap in development
 - a. Ruggedized device
 - b. Specialized use devices, one handed / gloved
 - c. High Power UE availability
 - d. Dual mode Long Term Evolution/Land Mobile Radio (LTE/LMR) device development
 - e. Develop FirstNet device approval process in use
4. FirstNet UICC profile defined, FirstNet UICC available
5. Applications store and ecosystem Phase 1
 - a. FirstNet application store for public safety applications (mobile, server and desktop)
 - b. Apps available from FirstNet and commercial app stores
 - c. Infrastructure as a service (hosting processors, cores and storage)
 - d. Software as a Service (SaaS)
 - e. Identity as a Service (IdaaS)
 - f. Agency onboarding

- g. User management application
 - h. Customizable agency specific home pages
 - i. Situational awareness application
 - j. Support for Over The Top (OTT) LTE Push-To-Talk (PTT) interoperability with LMR application(s)
 - k. Video sharing application(s)
 - l. Messaging application(s)
 - m. Secure data services and network services for PS agency users
 - n. Application developer ecosystem, Mobile Application Development Platform (MADP)
 - o. Application certification environment
- 6. Contractor's core
 - 7. Commercially available data and voice services
 - a. Using Contractor(s) core
 - b. LTE consumer grade data / video service and messaging (in major population areas)
 - c. LTE consumer grade Voice over Long Term Evolution (VoLTE) and 3G voice (in major population areas) –offeror(s) dependent
 - d. Consumer grade streaming video
 - e. Circuit-switched (CS) fallback and roaming to commercial network using network contractor(s) where FirstNet coverage not available; including emergency calling (911)
 - f. Contractor's basic Location Based Services (LBS) support
 - g. Includes contractor's Mobility Management Entity (MME), Serving/PDN Gateway (S/PGW), Home Subscriber Server (HSS), Policy and Charging Rules Function (PCRF) and IP Multimedia Subsystems (IMS)
 - h. Contractor's Commercial Mobile Alert System (CMAS), Lawful Interception (LI) , and evolved Multimedia Broadcast Multicast Service (eMBMS) services

4.1.3 IOC-1 – Systems

- 1. PSEN onboarding and interconnection
- 2. Using contractor(s) systems
- 3. Define access classes and QoS framework
- 4. On-Network QoS basic (infrastructure)
- 5. QPP design
- 6. QPP slightly higher priority than commercial users; no pre-emption for public safety users
- 7. Local control Phase 1
 - a. Agencies able to manage accounts and subscriptions
 - b. Agencies able to manage users, groups and basic profiles
 - c. Agencies able to manage devices and basic profiles
- 8. ICAM Phase 1
 - a. Local agencies manage user identity proofing, issuing of credentials
 - b. Initial federated identity management of early adopters

4.1.4 IOC-1 – Hardening / Security

- 1. Contractor(s) current hardening and security
- 2. Basic security services
- 3. Secure data services

4.2 IOC-2

This phase is targeted to begin one (1) year after the completion of IOC-1. In addition to the features and functionalities targeted to be available at the launch of FirstNet, these additional features and functionalities are targeted to be available:

4.2.1 IOC-2 – RF Solutions

1. Band 14 coverage begins in selected areas
2. 15% Band 14 coverage objectives met
3. 15% of substantial rural milestones met

4.2.2 IOC-2 – Services

1. Band 14 device portfolio available
2. Band 14 enabled low cost commercial devices
3. Open Mobile Alliance (OMA) Device Management (DM) Working Group (OMA-DM) Local Control
4. Connection manager support for local control
5. Application store and ecosystem Phase 2
 - a. Steady stream of new public safety applications
 - b. Applications with static QPP and ICAM enhancements
 - c. Software Development Platform (SDP) framework integration for FirstNet which includes middleware and back-end network services integration
 - d. QPP control/management application
 - e. Mobile Application Management (MAM) Application
 - f. Mobile Device Management (MDM) Application
 - g. User, data and service analytics
 - h. Machine-To-Machine (M2M) applications
6. FirstNet Core online and in use
 - a. On-Network QoS basic (infrastructure and device)
 - b. FirstNet core (MME, S/PGW, HSS, PCRF) and contractor's IMS
 - c. Basic Band 14 LTE public safety grade data / video service and messaging (in major population areas)
 - d. Basic Band 14 LTE public safety grade VoLTE (in major population areas)
 - e. Multicast video
 - f. PTT consumer grade
 - g. FirstNet Location, CMAS, LI, and eMBMS services
 - h. Contractor 3G network interworking with Band 14 coverage

4.2.3 IOC-2 – Systems

1. QPP available on Band 14
2. Local control Phase 2
 - a. Agencies able to manage services and applications, including static QPP
 - b. Policy management of users, groups, devices, services, and applications
 - c. Agency monitoring of network status and operations
3. ICAM Phase 2
 - a. Attribute-Based Access Controls (ABAC) of users, groups, and devices
 - b. Single Sign-On (SSO)
 - c. Federated access to regional and federal applications and resources

4.2.4 IOC-2 – Hardening / Security

1. Enhanced security
2. End-to-End bearer encryption
3. RAN hardening Phase 1 - Geographic threat mitigation, RAN backhaul redundancy and power backup milestone
4. Core hardening Phase 1 - core hardening, redundancy and geo-diverse transport

4.3 IOC-3

This phase is targeted to begin two (2) years after the completion of IOC-2. In addition to the features and functionalities targeted to be available at IOC 2, these additional features and functionalities are targeted to be available:

4.3.1 IOC-3 – RF Solutions

1. 60% Band 14 coverage milestones met
2. 40% of substantial rural milestones met

4.3.2 IOC-3 – Services

1. Enhanced Band 14 LTE public safety grade data / video service and messaging (in major population areas)
2. Enhanced Band 14 LTE public safety grade VoLTE (in major population areas)
3. Multi-cast in CMAS
4. Direct mode consumer grade
5. Application store and ecosystem Phase 3
 - a. Integrated access to local, tribal and state applications
 - b. PSEN agency provisioning and billing integration of agency applications

4.3.3 IOC-3 – Systems

1. NG911 systems support, FN services support integration to NG911 systems
2. Multi-cast service available
3. 3GPP Group Communication System Enablers (GCSE)
 - a. Direct mode support
4. 3GPP Proximity Services (ProSe)
5. Dynamic QPP available on Band 14
6. Local control Phase 3
 - a. Dynamic management of QPP
7. ICAM System Phase 3
 - a. Federated access to local, tribal, and state applications and resources
 - b. Federation of multiple trust frameworks

4.4 IOC-3 – Hardening / Security

1. RAN Hardening Phase 2 - geographic threat mitigation, RAN backhaul redundancy and power backup milestone
2. Core hardening Phase 2 - Core hardening, redundancy and geo-diverse transport

4.5 IOC-4

This phase is targeted to begin three (3) years after the completion of IOC-3. In addition to the features and functionalities targeted to be available at IOC 3, these additional features and functionalities are targeted to be available:

4.5.1 IOC-4 – RF Solutions

1. 80% Band 14 coverage objectives met
2. 60% of substantial rural milestones met

4.5.2 IOC-4 – Services

1. Mobile Communications Unit (MCU)
2. Application ecosystem evolution
3. Location based services (LBS) evolution
4. Mission critical services
5. Services evolutions

4.5.3 IOC-4 – Systems

1. Location based services (LBS) evolution
2. Mission critical systems, mission critical PTT, group communications
3. Local control evolution
4. ICAM evolution

4.5.4 IOC-4 – Hardening / Security

1. RAN hardening Phase 3 geographic threat mitigation, RAN backhaul redundancy and power backup milestone
2. Core hardening Phase 3 core hardening, redundancy and geo-diverse transport

5 IOC-5

This phase is targeted to begin four (4) years after the completion of IOC-4. In addition to the features and functionalities targeted to be available at IOC-4, these additional features and functionalities are targeted to be available:

5.1 IOC-5 – RF Solutions

1. 95% Band 14 coverage objectives met and all major highways covered
2. 80% of substantial rural milestones met

5.2 IOC-5 – Services

1. Device ecosystem evolution
2. Application ecosystem evolution
3. Core services evolution

5.3 IOC-5 – Systems

1. Systems evolution
2. Local control evolution
3. ICAM evolution

5.4 IOC-5 – Hardening / Security

1. RAN hardening evolution
2. Core hardening evolution

6 FOC

Five (5) years post contract award the FirstNet contractor(s) delivers on all milestones, services, systems and hardening.

1. Band 14 coverage objectives met
2. Rural milestones met

7 Additional Features

Beyond the features and functions targeted to be available 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.

1. LTE Radio OTA diagnostics
2. Roaming network QoS control
3. Video sharing across PSEs
4. Future 3GPP release features and functions
5. Future 5G features and functions

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