Minimum Standards for

Communication Equipment Purchases

January 2012

Version 2.1

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Record of Version		
VERSION NUMBER	DATE	DESCRIPTION
Baseline Version 1.0	10/30/09	Baseline Document Released
Version 1.01	11/03/09	• Replaced Digital Coded Squelch with Capable Continuous Tone-Coded Squelch System. • Removed Reference to Interoperability Frequencies for UHF and 800 MHz Infrastructure.
Version 2.0	06/02/2011	Annual IOCSS Working Group Update: • Inserted Digital Coded Squelch Requirements. • Reduced the 12-Character Display to 10-character Display. • Inserted the Oklahoma Common Channels Programming Requirement. • Inserted the VHF High Band Oklahoma Common Channels (Narrowband).
Version 2.1	1/5/2012	• Inserted language to reflect the Public Safety vs. Commercial Recommendation. • Inserted language to address the Project 25 Mandate for Digital Subscribers.

1   Introduction

The lack of adequate, reliable and interoperable communications systems has been a challenge for public safety agencies in the state of Oklahoma and across the country for decades. In many cases, agencies cannot perform their mission-critical duties effectively, because they are unable to communicate vital voice or data information inter-jurisdictionally in daily operations or in emergency situations.

In the state of Oklahoma, cultural resistance to change and limited funding has held the communications capabilities of most agencies well behind the current standard and has caused systems to be developed independently of one another. In order to resolve some of these issues and create a more formalized process for communications interoperability planning, the Oklahoma Legislature passed Senate Bill 1153 (OSL 2009, SB 1153, c. 212, § 1) in early 2009.

SB 1153 is critical to communications interoperability efforts in the state of Oklahoma for several reasons. First, it names the Oklahoma Office of Homeland Security (OKOHS) as a central point of contact for all statewide communications interoperability planning. Next, SB 1153 enumerates the planning duties for OKOHS. These duties include the following:

- Oversight and implementation of the Statewide Communication Interoperability Plan (SCIP).

- Coordination of a migration plan for use of communications interoperability technologies including aid to connect disparate systems used by public safety agencies.

- Assistance with applying for, receiving, and holding authorization for frequencies and channels for state agencies.

SB 1153 makes the effort to improve statewide interoperable communications a priority in the state of Oklahoma.

One of the most important aspects of SB 1153 is that it gives OKOHS the ability to create standards for future purchases of equipment and infrastructure made by state agencies in support of communications interoperability in Oklahoma. The goal of these standards is to eliminate redundancy and ensure the compatibility of new purchases with existing technology.

2   Methodology

The Interoperable Communications State Standards (IOCSS) Working Group was formalized in 2009 and is composed of representatives from multiple state and local agencies to recommend minimum standards for communication equipment purchases. It was imperative to include multiple agencies with a vested interest in communications interoperability to ensure the success of these minimum standards. The IOCSS will meet as needed to establish and modify minimum standards for communication equipment.

The standards will be implemented in the following phases:

Phase 1: Implement Subscriber Equipment Standards (Includes Mobile and Portable Radios)[1]

Phase 2: Implement Repeater Equipment Standards (Best practices)

Phase 3: Implement Infrastructure Standards (Tower Sites)

Phase 4: Implement Tactical Communications Equipment Standards (Gateways)

Phase 5: Implement Data Connectivity Standards

This is a living document, and additional information will be added to this document as minimum standards are defined for the forthcoming phases.

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[1] Phase 1 is currently available at www.ioc.ok.gov.

3   Phase I: Subscribers

The following minimum standards for subscriber equipment have been defined for VHF (Low Band), VHF (High Band), UHF and 800 MHz radio equipment. All equipment purchases must adhere to the technical requirements defined below. At a minimum, each radio must be programmed with the applicable interoperability frequencies as defined below for each frequency band.

3.1   Public Safety vs. Commercial Recommendation

It is *recommended*, but not required, that any radio system used in a public safety setting be specified for public safety use by the manufacturer.

3.2   Project 25 Mandate for Digital Subscriber Equipment

Radio systems operating in digital mode must use the Association of Public Safety Communication Officials (APCO) Project 25 standard. The P25 standard will be the only accepted digital standard for public safety radio in the state of Oklahoma. Agencies are encouraged to use analog narrowband operation to meet the January 1, 2013, narrowband mandate established by the Federal Communications Commission.

3.3   VHF (Low Band) Radio (33 – 50 MHz)

VHF (Low Band) equipment can only be purchased to support existing VHF (Low Band) communication systems. OKOHS strongly discourages any state agency from purchasing a new VHF (Low Band) system without justifiable cause.

All new purchases of VHF (Low Band) radio equipment must adhere to the following minimum requirements:

- Federal Communications Commission (FCC) Part 90 Type Accepted
- Capable of Continuous Tone-Coded Squelch System (CTCSS)
- Minimum of 10 character alpha numeric display
- Minimum of 60 watts power for all mobile radio equipment
- Minimum of 4 watts for all portable radio equipment
- Minimum of 32 channels
- Compliant with Mil Spec 810 C, 810 D and 810 E
- Programmed with the Non-Federal VHF low band National Interoperability Frequencies as defined in the VHF low band tables listed below
- Equipped with Project 25 software, if capable of digital operation

All radios purchased must be programmed with the National Interoperability Channels as defined by National Public Safety Telecommunications Council's (NPSTC) Channel Naming Report dated June 13,

2007. Until licensed by the FCC, these frequencies can only be used for the immediate protection of life or property; radio users may use prudent measures beyond the specifics of their license.

3.3.1   Simplex VHF (Low Band) Interoperability Channels

Simplex VHF (Low Band) Interoperability Channels for Subscriber Equipment			
Description	NPSTC ID	Channel (MHz)	CTCSS Tone ±
Law Enforcement	LLAW1	39.4600	CSQ*/156.7
Fire (Proposed)	LFIRE2	39.4800	
Law Enforcement	LLAW3	45.8600	
Fire	LFIRE4	45.8800	
±Default operation should be carrier squelch receive, Continuous Tone Coded Squelch System (CTCSS) transmit. If the user can enable/disable without reprogramming the radio, the indicated CTCSS tone should also be programmed for receive, and the user instructed how and when to enable/disable. *Carrier Squelch (CSQ); No sub-audible tone on either the receiver or transmitter.			

3.4   VHF (High Band) Radio (150 – 162 MHz)

All new purchases of VHF (High Band) radio equipment must adhere to the following minimum requirements:

- FCC Part 90 Type Accepted
- Capable of Continuous Tone-Coded Squelch System (CTCSS)
- Capable of Digital-Coded Squelch (DCS)
- Narrowband-compliant according to FCC emissions 11K2F3E
- Wideband-compliant according to FCC emissions 20K0F3E
- Minimum of 10 character alpha numeric display
- Minimum of 120 channels
- Minimum of 25 watts power for all mobile radio equipment (A minimum of 40 watts is recommended.)
- Minimum of 4 watts for all portable radio equipment
- Compliant with Mil Spec 810 C, 810 D and 810 E
- Programmed with the Non-Federal VHF High Band National Interoperability Frequencies as defined in the VHF High Band tables listed below
- Programmed with the Oklahoma VHF Common Channels as defined in the VHF High Band tables listed below
- Equipped with Project 25 software, if capable of digital operation

All new VHF (High Band) radio equipment must be programmed with the National Interoperability Channels as defined by NPSTC's Channel Naming Report dated June 13, 2007. The IOCSS strongly recommends that all new VHF (High Band) must be programmed with the local mutual aid channels for police, fire and EMS. Any use as a base station, repeater or control station will require an FCC radio

license; however, the VHF (High Band) National Interoperability Channels are covered by a "blanket authorization" from the FCC for mobile operation. Mobile operation is an FCC reference to a radio frequency that is only to be used in a mobile or portable radio.

3.4.1 Simplex VHF (High Band) Interoperability Channels

Simplex VHF (High Band) Interoperability Channels for Subscriber Equipment*				
Description	Authorized Use	NPSTC ID	Channel (MHz)	CTCSS
Calling	base/mobile	VCALL10	155.7525	CSQ /156.7 (5A)
Tactical	base/mobile	VTAC11	151.1375	CSQ /156.7 (5A)
Tactical	base/mobile	VTAC12	154.4525	CSQ /156.7 (5A)
Tactical	base/mobile	VTAC13	158.7375	CSQ /156.7 (5A)
Tactical	base/mobile	VTAC14	159.4725	CSQ /156.7 (5A)
Description	Authorized Use	Wideband Channel ID	Channel (MHz)	CTCSS
Law Enforcement	base/mobile	STATE LAW	155.4900±	
Fire	base/mobile	STATE FIRE	154.1300±	
Public Safety	base/mobile	STATE NET	155.6700±	
EMS	base/mobile	HEARS	155.3400±	
Local Government	base/mobile	OK LG MA	155.7600±	
Description	Authorized Use	Narrowband Channel ID	Channel (MHz)	CTCSS
Law Enforcement	base/mobile	OKLAW1	155.4900	CSQ /156.7
Fire	base/mobile	OKFIRE1	154.1300	CSQ /156.7
Public Safety	base/mobile	OKNET1	155.6700	CSQ /156.7
EMS	base/mobile	VMED28	155.3400	CSQ /156.7
Local Government	base/mobile	OKLGMA1	155.7600	CSQ /156.7

* To date, the state of Oklahoma has not licensed "State Law," "State Fire," "State Net," "HEARS" and "OK LG MA" mutual aid frequencies statewide for all state agencies; however, all radios purchased must be programmed with the statewide frequencies listed above. Until licensed by the FCC, these frequencies can only be used for the immediate protection of life or property; radio users may use prudent measures beyond the specifics of their license.

±These frequencies must use a 12.5 kHz bandwidth by January 1, 2013. If capacity permits, it is recommended these frequencies be programmed as both wideband and narrowband in radios. If capacity is limited, these frequencies should be programmed as wideband and reprogrammed for narrowband emission as part of a communications plan to transition local frequencies to narrowband.

3.5 Minimum Requirements for UHF Radio Equipment (450 – 470 MHz)

All new purchases of UHF radio equipment must adhere to the following minimum requirements:

- FCC Part 90 Type Accepted

- Non-proprietary platform
- Capable of Continuous Tone-Coded Squelch System (CTCSS)
- Capable of Digital Coded Squelch (DCS)
- Narrowband-compliant according to FCC emission 11K2F3E
- Wideband-compliant according to FCC emission 20K0F3E
- Minimum of 10 character alpha numeric display
- Minimum of 120 channels
- Minimum of 25 watts power for all mobile radio equipment (A minimum of 40 watts is recommended.)
- Minimum of 4 watts for all portable radio equipment
- Compliant with Mil Spec 810 C, 810 D and 810 E
- Programmed with the Non-Federal UHF National Interoperability Frequencies as defined in the UHF tables listed below
- Equipped with Project 25 software, if capable of digital operation

All new UHF radio equipment must be programmed with the National Interoperability Channels as defined by NPSTC's Channel Naming Report dated June 13, 2007. Any use as a base station, repeater or control station will require an FCC radio license; however, the UHF National Interoperability Channels are covered by a "blanket authorization" from the FCC for mobile operation. Mobile operation is an FCC reference to a radio frequency that is only to be used in a mobile or portable radio. All of the frequencies listed in the tables below are narrowband (11K2F3E) only. Usage of any UHF channel in the simplex mode as base stations is preferred over their usage as repeater stations to minimize interference.

3.5.1   Repeated UHF Interoperability Channels

Repeated UHF Interoperability Channels for Subscriber Equipment						
Desc	NPSTC ID	CTCSS*	TX Freq	Authorized Use	RX Freq	Authorized Use
Calling	UCALL40	156.7 Hz	458.2125	Mobile Output	453.2125	Mobile Input
Tactical	UTAC41	156.7 Hz	458.4625	Mobile Output	453.4625	Mobile Input
Tactical	UTAC42	156.7 Hz	458.7125	Mobile Output	453.7125	Mobile Input
Tactical	UTAC43	156.7 Hz	458.8625	Mobile Output	453.8625	Mobile Input
* Default operation should be carrier squelch receive, CTCSS 156.7 transmit. If the user can enable/disable CTCSS without reprogramming the radio, the indicated CTCSS tone should also be programmed for receive, and the user instructed how and when to enable/disable.						

3.5.2   Simplex UHF Interoperability Channels

Simplex UHF Interoperability Channels for Subscriber Equipment						
Desc	NPSTC ID	CTCSS*	TX Freq	Authorized Use	RX Freq	Authorized Use
Calling	UCALL40D	156.7 Hz	453.2125	Mobile Direct Output	453.2125	Mobile Direct Input
Tactical	UTAC 41D	156.7 Hz	453.4625	Mobile Direct Output	453.4625	Mobile Direct Input

Simplex UHF Interoperability Channels for Subscriber Equipment						
Tactical	UTAC42D	156.7 Hz	453.7125	Mobile Direct Output	453.7125	Mobile Direct Input
Tactical	UTAC43D	156.7 Hz	453.8625	Mobile Direct Output	453.8625	Mobile Direct Input

* Default operation should be carrier squelch receive, CTCSS 156.7 transmit. If the user can enable/disable CTCSS without reprogramming the radio, the indicated CTCSS tone should also be programmed for receive, and the user instructed how and when to enable/disable.

 D – Denotes low side of the frequency pair in direct (simplex) mode

3.6 Minimum Requirements for 800 MHz Radio Equipment (806 – 870 MHz) Pre-Rebanding[2]

- FCC Part 90 Type Accepted
- Equipped with P25 software
- Capable of Continuous Tone-Coded Squelch System (CTCSS)
- Capable of Digital Coded Squelch (DCS)
- Compliant with FCC National Public Safety Planning Advisory Committee (NPSPAC) emissions 16K0F3E and 20K0F3E
- Minimum of 12 character alpha numeric display
- Minimum of 256 channels (talkgroups) for both mobile and portable radios
- Minimum of 10 watts power for all mobile radio equipment
- Minimum of 3 watts for all portable radio equipment
- Compliant with Mil Spec 810 C, 810 D, 810 E and 810 F
- Programmed with the Non-Federal 800 MHz National Interoperability Frequencies as defined in the 800 MHz tables listed below

All new 800 MHz radio equipment must be programmed with both the pre- and post-rebanding National Interoperability Channels as defined by NPSTC's Channel Naming Report dated June 13, 2007. Any use as a base station, repeater or control station will require an FCC radio license and approval from Oklahoma NPSPAC Region 34; however, the 800 MHz National Interoperability Channels are covered by a "blanket authorization" from the FCC for mobile operation. Mobile operation is an FCC reference to a radio frequency that is only to be used in a mobile or portable radio. The FCC is currently in the process of rebanding the 800 MHz radio spectrum across the United States. Oklahoma is currently in the process of rebanding its 800 MHz radio spectrum. All pre-rebanding information specific to the 800 MHz spectrum will be removed from this document upon completion of the 800 MHz rebanding initiative.

3.6.1 Repeated 800 MHz Interoperability Channels (Pre-Rebanding)

Repeated 800 MHz Interoperability Channels for Subscriber Equipment (Pre-Rebanding) ±						
Desc	NPSTC ID	CTCSS*	TX Freq	Authorized Use	RX Freq	Authorized Use
Calling	ICALL	156.7 Hz	821.0125	Mobile Output	866.0125	Mobile Input

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[2] This section will be removed from this document upon completion of the 800 MHz rebanding initiative.

Repeated 800 MHz Interoperability Channels for Subscriber Equipment (Pre-Rebanding) ±						
Desc	NPSTC ID	CTCSS*	TX Freq	Authorized Use	RX Freq	Authorized Use
Tactical	ITAC 1	156.7 Hz	821.5125	Mobile Output	866.5125	Mobile Input
Tactical	ITAC 2	156.7 Hz	822.0125	Mobile Output	867.0125	Mobile Input
Tactical	ITAC3	156.7 Hz	822.5125	Mobile Output	867.5125	Mobile Input
Tactical	ITAC4	156.7 Hz	823.0125	Mobile Output	868.0125	Mobile Input

*Default operation should be carrier squelch receive, CTCSS 156.7(5A) transmit. If the user can enable/disable CTCSS without reprogramming the radio, the indicated CTCSS tone should also be programmed for receive, and the user instructed how and when to enable/disable.

± This information will be deleted upon completion of the 800 MHz rebanding initiative currently taking place in Oklahoma.

3.6.2 Simplex 800 MHz Interoperability Channels (Pre-Rebanding)

Simplex 800 MHz Interoperability Channels for Subscriber Equipment (Pre-Rebanding) ±						
Desc	NPSTC ID	CTCSS*	TX Freq	Authorized Use	RX Freq	Authorized Use
Calling	ICALL	156.7 Hz	866.0125	Mobile Direct Output	866.0125	Mobile Direct Input
Tactical	ITAC 1	156.7 Hz	866.5125	Mobile Direct Output	866.5125	Mobile Direct Input
Tactical	ITAC 2	156.7 Hz	867.0125	Mobile Direct Output	867.0125	Mobile Direct Input
Tactical	ITAC3	156.7 Hz	867.5125	Mobile Direct Output	867.5125	Mobile Direct Input
Tactical	ITAC4	156.7 Hz	868.0125	Mobile Direct Output	868.0125	Mobile Direct Input

*Default operation should be carrier squelch receive, CTCSS 156.7(5A) transmit. If the user can enable/disable CTCSS without reprogramming the radio, the indicated CTCSS tone should also be programmed for receive, and the user instructed how and when to enable/disable.

D – Denotes low side of the frequency pair in direct (simplex) mode

± This information will be deleted upon completion of the 800 MHz rebanding initiative currently taking place in Oklahoma.

3.7 Minimum Requirements for 800 MHz Radio Equipment (806 – 870 MHz) Post Rebanding

- FCC Part 90 Type Accepted
- Equipped with P25 software
- Capable of Continuous Tone-Coded Squelch System (CTCSS)
- Capable of Digital Coded Squelch
- In Compliance with FCC NPSPAC emissions 16K0F3E and 20K0F3E
- Minimum of 12 character alpha numeric display
- Minimum of 256 channels (talkgroups) for both mobile and portable radios
- Minimum of 10 watts power for all mobile radio equipment
- Minimum of 3 watts for all portable radio equipment

- Compliant with Mil Spec 810 C, 810 D, 810 E and 810 F
- Programmed with the Non-Federal 800 MHz National Interoperability Frequencies as defined in the 800 MHz tables listed below

All new 800 MHz radio equipment must be programmed with both the pre- and post-rebanding national interoperability channels as defined by NPSTC's Channel Naming Report dated June 13, 2007. Any use as a base station, repeater or control station will require an FCC radio license and approval from Oklahoma NPSPAC Region 34; however, the 800 MHz national interoperability channels are covered by a "blanket authorization" from the FCC for mobile operation. Mobile operation is an FCC reference to a radio frequency that is only to be used in a mobile or portable radio. The FCC is currently in the process of rebanding the 800 MHz radio spectrum across the United States. Oklahoma is currently in the process of rebanding its 800 MHz radio spectrum. All pre-rebanding information specific to the 800 MHz spectrum will be removed from this document upon completion of the 800 MHz rebanding initiative.

3.7.1   Repeated 800 MHz Interoperability Channels (Rebanded)

Repeated 800 MHz Interoperability Channels for Subscriber Equipment (Rebanded) ±						
Desc	NPSTC ID	CTCSS*	TX Freq	Authorized Use	RX Freq	Authorized Use
Calling	8CALL90	156.7 Hz	806.0125	Mobile Output	851.0125	Mobile Input
Tactical	8TAC91	156.7 Hz	806.5125	Mobile Output	851.5125	Mobile Input
Tactical	8TAC92	156.7 Hz	807.0125	Mobile Output	852.0125	Mobile Input
Tactical	8TAC93	156.7 Hz	807.5125	Mobile Output	852.5125	Mobile Input
Tactical	8TAC94	156.7 Hz	808.0125	Mobile Output	853.0125	Mobile Input
*Default operation should be carrier squelch receive, CTCSS 156.7(5A) transmit. If the user can enable/disable CTCSS without reprogramming the radio, the indicated CTCSS tone should also be programmed for receive, and the user instructed how and when to enable/disable. ± This information included in this table will become applicable upon completion of the 800 MHz rebanding initiative currently taking place in Oklahoma.						

3.7.2   Simplex 800 MHz Interoperability Channels (Rebanded)

Simplex 800 MHz Interoperability Channels for Subscriber Equipment (Rebanded) ±						
Desc	NPSTC ID	CTCSS*	TX Freq	Authorized Use	RX Freq	Authorized Use
Calling	8CALL90D	156.7 Hz	851.0125	Mobile Direct Output	851.0125	Mobile Direct Input
Tactical	8TAC91D	156.7 Hz	851.5125	Mobile Direct Output	851.5125	Mobile Direct Input
Tactical	8TAC92D	156.7 Hz	852.0125	Mobile Direct Output	852.0125	Mobile Direct Input
Tactical	8TAC93D	156.7 Hz	852.5125	Mobile Direct Output	852.5125	Mobile Direct Input
Tactical	8TAC94D	156.7 Hz	853.0125	Mobile Direct Output	853.0125	Mobile Direct Input
*Default operation should be carrier squelch receive, CTCSS 156.7(5A) transmit. If the user can enable/disable CTCSS without reprogramming the radio, the indicated CTCSS tone should also be						

Simplex 800 MHz Interoperability Channels for Subscriber Equipment (Rebanded) ±						
Desc	NPSTC ID	CTCSS*	TX Freq	Authorized Use	RX Freq	Authorized Use

programmed for receive, and the user instructed how and when to enable/disable.

D – Denotes low side of the frequency pair in direct (simplex) mode

± This information included in this table will become applicable upon completion of the 800 MHz rebanding initiative currently taking place in Oklahoma.

3.8   Communication Equipment Accessories

To date, the minimum requirements for radio equipment accessories have not been defined by the IOCSS. This section will be updated after further assessment by the IOCSS.

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