

# **Narrowband Conversion and Digital Modulation**

## **A CSI Telecommunications, Inc. White Paper**

By William F. Ruck

### **Introduction**

In response to ever growing demands for more radio channels and faced with a limited radio spectrum, in March 2007 the Federal Communications Commission (FCC) adopted new rules to make more radio channels available in the 150-174 MHz VHF and 421-512 MHz UHF Industrial/Business and Public Safety Radio Pool bands (which include most state and local governmental agencies).

The FCC reduced the bandwidth of the channels to 15 kHz from 30 kHz (VHF band) and to 12.5 kHz from 25 kHz (UHF band), half the size of the currently existing channels in these frequency bands. All licensees must migrate to the new, narrower channels by January 1, 2013 by modifying their licenses and by ensuring that all of their equipment is certified to operate in the narrower bandwidth.

There are narrowband modulation technologies that meet the new rules with both analog and digital forms of modulation. Contradictory information about the rules and technologies has resulted in confusion for licensees. As an independent engineering consultant, unaffiliated with any equipment manufacturer, CSI offers this white paper to clarify what the FCC has and, more importantly, has not mandated as licensees convert to narrowband.

### **Narrowband Conversion**

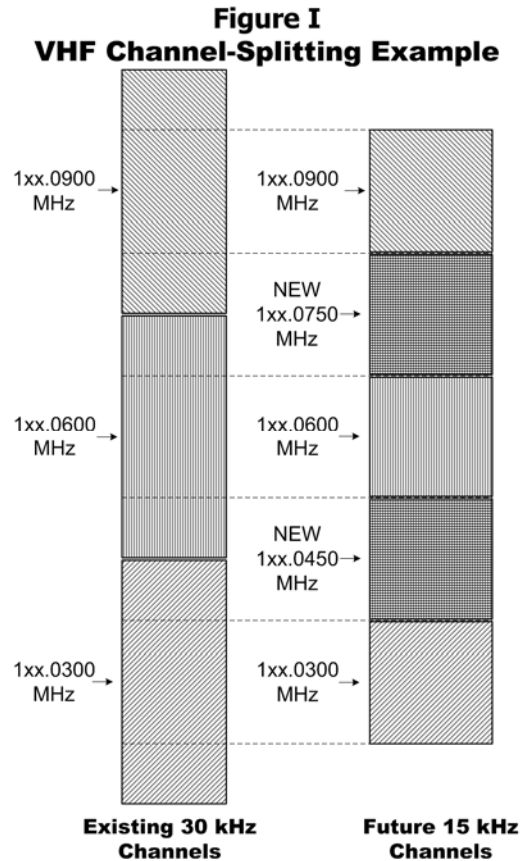
In a rule making proceeding entitled "Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies", the Federal Communications Commission (FCC) mandated a reduction in the occupied bandwidth of Industrial /Business and Public Safety Radio Pool radio systems in the 150-174 MHz VHF and 421-512 MHz UHF bands to allow more radio channels to be made available. There is precedent for this conversion. VHF radio channels were originally 60 kHz wide, based on the equipment available at the time (1950). As technology improved allowing narrower channels and some areas started experiencing congestion, the FCC split the 60 kHz channels into two 30 kHz wide channels. These were called "narrowband" channels. Forty years later the FCC again split the "narrowband" 30 kHz channels in half, making 15 kHz wide channels. In the UHF band, formerly 50 kHz wide channels were split into 25 kHz wide

“narrowband” channels at the same time that the VHF channels were split. These channels are now being split into 12.5 kHz wide channels.

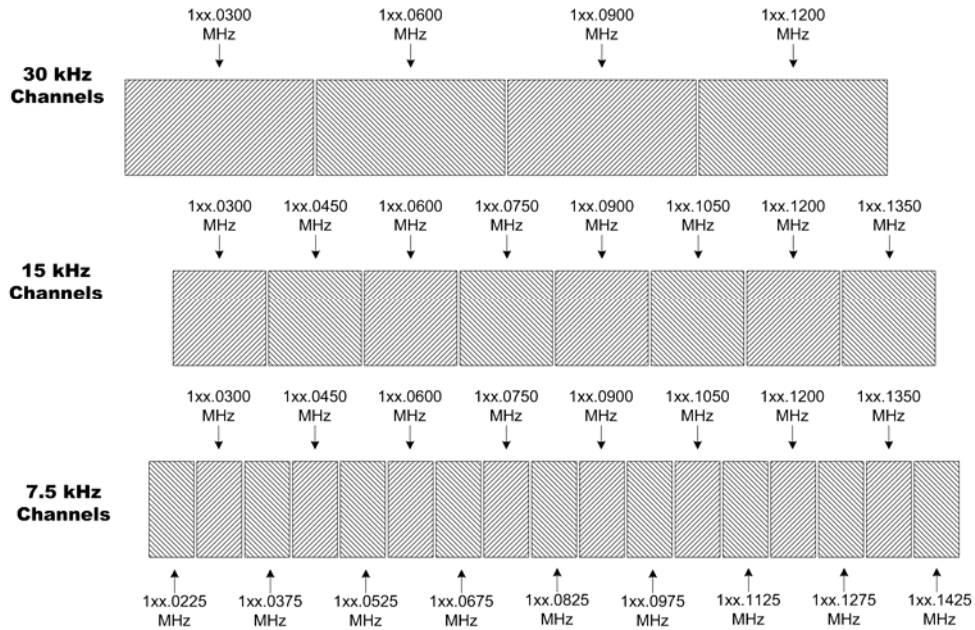
To explain this process in detail, look at the VHF channel-splitting example in Figure I below. The center frequency of an original 30 kHz channel remains the same while its bandwidth is reduced to 15 kHz.

To create new channels the upper one-quarter of one channel (“1xx.0300 MHz”) and the lower one-quarter of the adjacent channel (“1xx.0600 MHz”) are combined to make a new 15 kHz wide channel (“1xx.0450 MHz”) between the two original channel center frequencies. The process is repeated for the other new channel: the upper one-quarter of one channel (“1xx.0600 MHz”) and the lower one-quarter of the adjacent channel (“1xx.0900 MHz”) are combined to make a new 15 kHz wide channel (“1xx.0750 MHz”) between the two original channel center frequencies.

Thus, while new 15 kHz wide channels are created between them the three original channels are retained but narrowed to 15 kHz. This process is then repeated across the entire band. Figure II, on the next page, shows multiple channels and the difference between VHF and UHF channels.

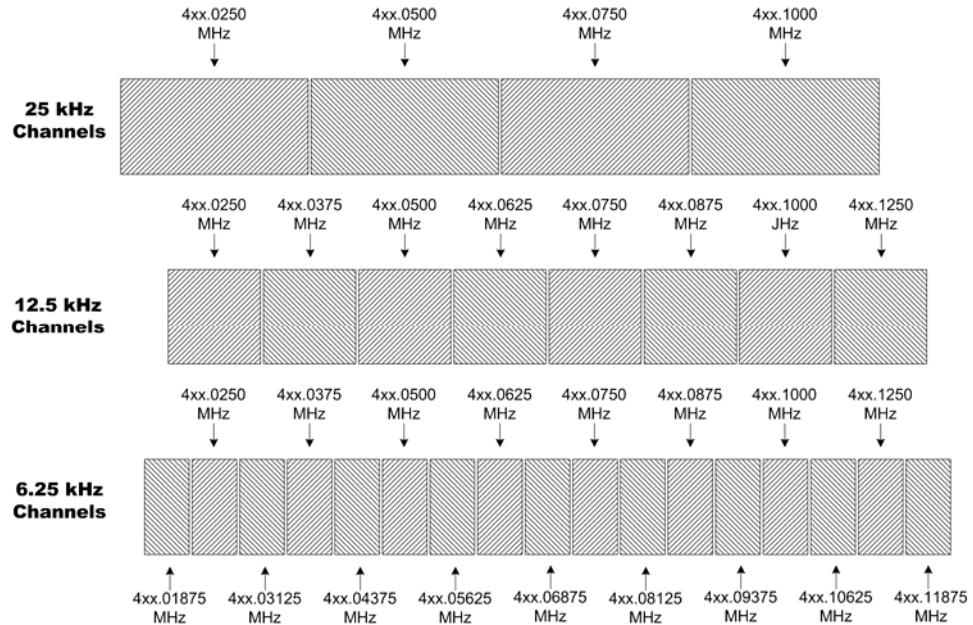


## Figure II VHF Channel-Splitting



Note:  
Frequencies are an example with standard 30 kHz VHF channels.

## UHF Channel-Splitting



Note:  
Frequencies are an example with standard 25 kHz UHF channels.

Discussing licensing issues requires a brief explanation of Emission Designators. The FCC uses "Emission Designators" on licenses to describe the actual modulation and occupied bandwidth of any transmission. Each character of the Emission Designator has significance, and this is detailed in §2.201 of the FCC Rules. [A more detailed explanation of Emission Designators and other technical terms used in this paper are in the End Notes.] Previously the Emission Designator for 30 kHz VHF and 25 kHz UHF analog voice channels was "20K0F3E". For analog voice transmission the Emission Designator for the 15 kHz VHF and 12.5 kHz UHF channels is "11K2F3E". For digital voice transmission the Emission Designator is "11K2F1E". Other forms of modulation such as paging and data use different designators. Selecting and using the proper Emission Designator is required to successfully complete FCC License applications and to evaluate your equipment for compliance.

The FCC's goal in narrowbanding was to make more radio channels available. However, when the FCC added the 15 (VHF)/12.5 (UHF) kHz "narrowband" channels and the 7.5/6.25 kHz even "narrowerband" channels to their tables in Sections 90.20 and 90.35 of the FCC rules, they also allowed applications for those frequencies on a "non-interference" basis. Thus, many of the 15/12.5 kHz channels have already been licensed. Exactly how many "new" frequencies will be available after the mandated conversion to 15/12.5 kHz channels will vary by area and can only be determined by a detailed interference analysis. In all cases, the Emission Designator 11K2F3E for analog voice and 11K2F1E for digital voice represents the maximum that can be used for voice transmissions after January 2013.

For a while there was a widely held belief that a licensee could continue to operate on 30/25 kHz channels (20K0F3E Emission Designator) after the deadline on a secondary basis as long as they did not cause interference. However, on December 11, 2009 in Public Notice DA 09-2589 the FCC asked the question "May a station that does not meet the January 1, 2013 narrowbanding deadline operate after that date on a secondary basis?" and answered "No. As of January 1, 2013, the Commission's rules will prohibit Industrial/Business and Public Safety Radio Pool licensees in the 150-174 MHz and 421-512 MHz bands from operating with wideband channels ... even if the license still lists a wideband emission designator. Operation in violation of the Commission's rules may subject licensees to enforcement action, including admonishments, monetary forfeitures, and/or license revocation, as appropriate." There are petitions for reconsideration filed with the FCC to delay this implementation date but unless the FCC decides to extend that deadline, again, there are no options after that date.

The FCC also stated in Public Notice DA 09-2589, "Licensees of stations that currently are authorized to operate with a bandwidth exceeding 12.5 kHz

that are transitioning to 12.5 kHz or narrower operation must file a modification application to either add a narrowband emission designator or change the wideband emission designator to a narrowband emission designator." [A copy of FCC Public Notice (FCC DA 09-2589) is appended to this White Paper for your convenience.]

Therefore, if Industrial/Business and Public Safety Radio Pool licensees desire to continue to operate their radio system after January 1, 2013 they must: (1) apply to the FCC to modify their license to add narrowband analog emission designators AND (2) purchase new equipment to replace all of their older 25 kHz only bandwidth (emission designator 20K0F3E) equipment with equipment that is certified to operate with 12.5 kHz bandwidth (emission designator 11K2F3E for analog voice or 11K2F1E for digital voice).

## **Equipment**

All new equipment that has been type certified since 1997 in the 150-174 MHz VHF and 421-512 MHz UHF bands must have the capability of operating with 12.5 kHz bandwidth (11K2F3E emission designator). This equipment can be used after January 1, 2013 provided that the equipment is reprogrammed to operate with that bandwidth and the 25 kHz bandwidth operation is disabled. However, equipment purchased prior to that date probably does not have the 12.5 kHz option and may not be used after January 1, 2013. Licensees may also have older equipment stored "just in case" that will no longer be legally useable after that date. More importantly, mountain top radio equipment tends to be "Out of sight, out of mind". There are many MICOR and MASTR II base stations still in service that are not certified to operate with 12.5 kHz bandwidth and which must be replaced.

While it may be possible to modify equipment to operate on the narrower bandwidth channels, the FCC also requires that the equipment be type certified to work at that bandwidth. Simply turning down the transmitter deviation does not meet this requirement on most older equipment. It is theoretically possible to modify equipment and have it certified for 11K2F3E emission designators but in most cases it is not cost effective to do this. **We cannot urge you strongly enough to inventory ALL of your equipment so there are no surprises in late 2012!**

During the transition period, licensees must be careful to avoid interference. The FCC does not protect receivers from unwanted reception of a station operating in accordance with its license. If any licensee is using a 25 kHz bandwidth system and a new station is coordinated 12.5 kHz above or below their frequency with 12.5 kHz bandwidth, that licensee cannot complain about

"interference" since their 25 kHz bandwidth receiver is not protected by FCC rules. At the same time, however, the existing 25 kHz channel transmitter will cause interference to nearby adjacent 12.5 kHz channel receivers either above or below the existing 25 kHz channel. Currently this makes it difficult to use a 12.5 kHz channel until the licensees on either side of that channel agree to reduce their bandwidth to 12.5 kHz. However, this particular interference issue becomes moot on January 1, 2013 when no transmitter will be authorized to operate with 25 kHz bandwidth.

Analog FM transmission systems have been developed that work satisfactorily in the 12.5 kHz (11K2F3E) channels. There is a slight loss of radio performance in weak signal areas. The best way to describe this is the areas that are presently "fuzzy" with 30/25 kHz channels will be "fuzzier" with the narrower 12.5 kHz bandwidth equipment. In good signal areas there is little difference in voice quality.

In the FOURTH MEMORANDUM OPINION AND ORDER (FCC 08-127, Released May 13, 2008) the FCC reiterated its intent to further reduce channel bandwidth to 6.25 kHz. The FCC stated "We reiterate, however, that 12.5 kHz technology is a transitional step in the eventual migration of PLMR systems to 6.25 kHz technology." The FCC admits that this 6.25 kHz technology is new and still evolving and only commits that they will monitor the development of 6.25 kHz technology and will start rule making to establish a transition date to the even narrower channels when the technology matures. At the present time all of the proposed 6.25 kHz bandwidth technology is digital.

Besides voice modulation, this rule making applies to any form of data or non-voice transmission in the VHF and UHF bands. Effective January 1, 2013 all systems must operate either in a 12.5 kHz bandwidth (Emission Designator 11K2F1D) or have the minimum of 4800 bits per second per 6.25 kHz of bandwidth, or 9600 bits per second for 12.5 kHz bandwidth. Many older data systems operate at much slower data speeds with a 25 kHz bandwidth and are clearly not able to meet this spectral efficiency standard.

Our experience suggests that tone paging systems that were designed for 25 kHz channels may not work reliably with the lower deviation that is required to satisfy the narrowband mask of 11K2F2D or 11K2F1D. Also, 25 kHz bandwidth receivers used in non-voice applications such as SCADA, or any other data application, may receive interference from adjacent 12.5 kHz channels in the future.

All non-voice radio equipment in use today must also be checked to determine that the transmitters are type certified for operation with Emission Designator 11K2F2D or 11K2F1D and can be set to 12.5 kHz bandwidth and that



the system receivers will work satisfactorily with this bandwidth and modulation. If not, new equipment must be purchased and installed if that particular non-voice use is to be maintained after January 1, 2013.

### **Modulation: Analog vs. Digital**

Concurrent to the narrow band requirement, has been the development of digital modulation technologies. One particular form of digital modulation is commonly known as "P25" from the committee that developed the standard, APCO Project 25. This is not the only digital modulation standard that is available to the land mobile radio community. For example, the railroad industry has selected "NXDN" as their digital voice radio modulation standard.

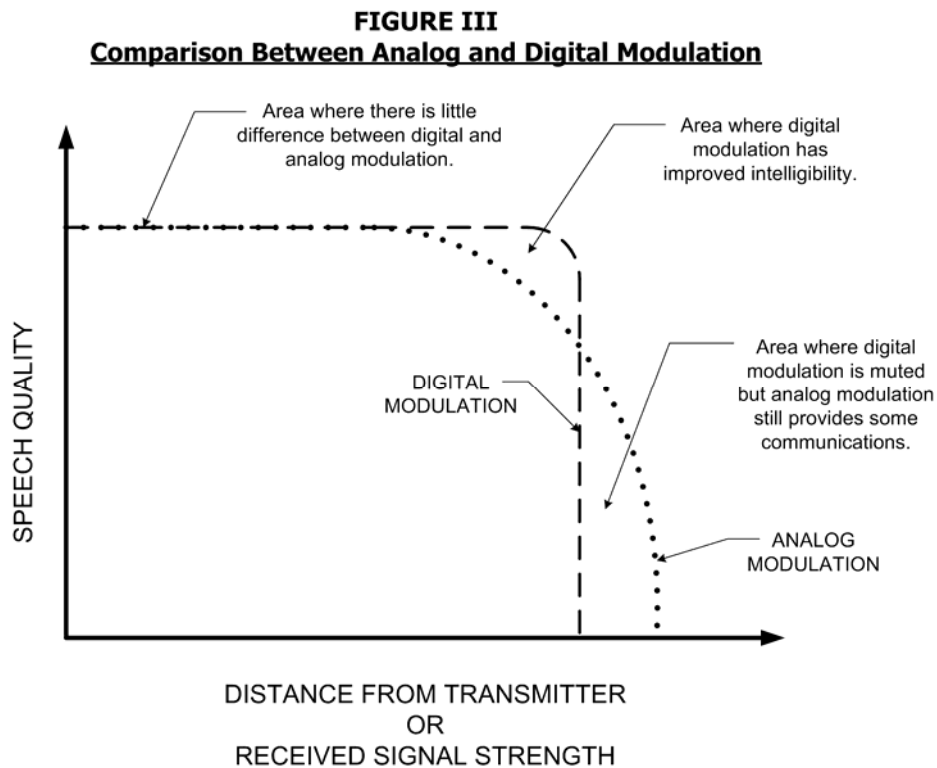
Although it is commonly stated that "the FCC requires P25", there is nothing in the entire volume of FCC Rules and Regulations that require any form of digital modulation for Part 90 Industrial/Business and Public Safety Pool VHF, UHF and 800 MHz channels. The only absolute FCC requirement for digital modulation is in the new 700 MHz band and the FCC has not specified any specific technology to meet this requirement.

Though the FCC has no specific technology requirements, some agencies that provide grants do. The United States Department of Homeland Security under the SAFECOM Program requires as part of any grant they fund that the equipment purchased must have "P25" capability. Additionally, the State of California Government Code 8592.5 requires that any equipment purchased with a grant they fund directly or administer for federal funds must meet "P25" standards. There is an exception to the State of California requirement in the event that "P25" equipment will not be compatible with existing communications systems. That code section also states "This section may not be construed to require an affected state or local governmental agency to compromise its immediate mission or ability to function and carry out its existing responsibilities."

When comparing analog modulation to digital modulation it is critical to recognize that, while there is little difference in performance and audio quality in good signal areas, there is a major difference between analog and digital modulation in poor signal areas. Analog modulation degrades slowly with more and more background noise as the signal gets weaker. Even though it may be difficult to understand a weak signal, with some care a message can be passed. Digital modulation is perfect until there is not enough signal for the decoder to work properly. When this happens the signal is muted and no communication is possible. There is not even an indication that someone is attempting to communicate.

Operationally, areas that are known to be “fuzzy” with analog modulation become completely “deaf” with digital modulation as represented graphically in Figure III, below. For that reason, to have equivalent practical coverage for a digital modulation radio system it may be necessary to add additional receive sites (for voting receivers) to improve talk-in and additional transmitter sites (for simulcast transmitters) to improve talk-out as compared to an analog modulation radio system. Each radio system needs to be carefully analyzed to determine the effect of changing modulation schemes on practical radio coverage areas.

Another critical concern when comparing analog and digital modulation is that the digital encoder can not process audio intelligibly when there is high background noise. This is particularly noticeable in the fire service. A fire truck pump operator may be difficult to understand with analog modulation when he is transmitting from an operating pump panel but becomes unintelligible in digital mode. In the police service there are documented accounts of when the officer was Code 3 and the siren wail kept the officer’s voice from being intelligible.





The final aspect that needs to be considered when comparing analog and digital is that not all manufacturers provide fully compatible equipment in digital mode. With analog equipment it has typically been possible to mix and match base station and mobile/portable radio equipment from different vendors. This is not necessarily the case with digital equipment. For marketing reasons and to allow special feature enhancement, some manufacturers have adopted proprietary modulation schemes. Neither of the Federal or State funding requirements mentioned earlier prohibits the purchase of dual mode – analog and digital modulation – equipment and that may be the best solution during the transition period. The only real advantage to digital modulation is that good encryption is possible with no loss in intelligibility, while analog encryption impacts intelligibility.

## **Summary**

- For general public safety communications today analog narrow band works well, is totally compatible among manufacturers, and provides a cost effective solution to the FCC narrowband mandate.
- All Industrial/Business and Public Safety Pool licensees in the 150-174 MHz VHF and 421-512 MHz UHF bands must acquire all new equipment to meet the 12.5/15 kHz bandwidth requirement if their existing equipment is not type certified for 12.5/15 kHz operation and modify their license to add the proper narrow band emission designator. Inventory ALL of your equipment now, so there are no surprises in late 2012!
- Since all equipment sold today must be capable of narrow band operation, and a new system has no legacy issues; it is recommended that any new High Band VHF or UHF voice radio system start with 12.5 kHz channels with a 11K2F3E Emission Designator (analog) or 11K2F1E Emission Designator (digital).
- Consider dual mode (analog and digital) equipment when necessary for interoperability and to comply with grant funding requirements.

## **End Notes**

**Bandwidth** The classic definition of bandwidth is “The range of frequencies within which the system performance in respect to some characteristic conforms to a specified standard.”

In this application the standard is FCC §90.210 (d) Emission Mask D - 12.5 kHz channel bandwidth equipment, which states:

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$  : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27(f_d - 2.88 \text{ kHz})$  dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5 kHz: At least  $50 + 10 \log (P)$  dB or 70 dB, whichever is the lesser attenuation.

The "Emission Mask" is the boundary for the occupied bandwidth of a transmission. As long as the energy of this transmission when observed with a spectrum analyzer fits inside the boundary defined by the Emission Mask the transmission can be said to be "within the mask" or "meeting the mask."

**Center Frequency** The frequency that defines the radio channel. It is the frequency that is listed on a license or entered into a radio.

**Channel** The full spectrum occupied by a radio system. It consists of the spectrum around a center frequency with a total width (measured, generally, in kHz) centered on this frequency.

**Emission Designator** An internationally accepted symbol for describing an emission in terms of its bandwidth and the characteristics of its modulation, if any. The FCC has adopted the international standard for defining the bandwidth and modulation of a radio system. The following is an example applicable to this paper:

<b>11K2</b>	<b>F</b>	<b>3</b>	<b>E</b>
Necessary Bandwidth 11.2 kHz	Frequency Modulation	Single Analog Channel	Voice

Full details of how the Emission Designator is defined can be found in §2.201 of the FCC rules.

**Narrowband** This term is widely used and its definition has changed over time. Historically, 50 (UHF) or 60 (VHF) kHz wide channels were called "wideband" and 25 (UHF) or 30 (VHF) kHz channels were called "narrowband". Since the FCC started the rule making regarding to improve the spectral efficiency of radio channels in 1999 the term today refers to radio channels with less than 12.5 kHz bandwidth. The January 2013 deadline is for all services to operate with "narrowband" or 12.5 kHz bandwidth. At some time in the future the FCC plans to initiate another rulemaking to reduce that "narrowband" channel to 6.25 kHz bandwidth "narrowerband" channels. That rulemaking has been deferred until sufficient technology is available to make it practical to operate on a 6.25 kHz channel.

## **CSI TELECOMMUNICATIONS, INC.**

CSI Telecommunications, Inc. is a California consulting engineering firm with a practice limited to telecommunications and electrical engineering. The firm has been in operation in its present form since 1986 and the associates of the firm have extensive experience in all aspects of this specialized field. William F. Ruck is one of CSI's Principal Engineers.

CSI performs design work, government agency and license application engineering, preparation of specifications, construction supervision, propagation analysis, measurements, testing, and operational review of:

- Public safety critical infrastructure radio systems
- Wireless communications and two way communications systems
- In building wireless distributive antenna systems
- DC Power Systems
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Our clients include city, county, and state government entities as well as wireless telecommunications carriers, telecommunications common carriers, industrial communications users, private broadcasting companies, educational institutions, cable television systems, and airports.

The firm maintains a fully equipped laboratory, and its library, containing over 1600 volumes, is one of the most complete private collections of telecommunications related material in the United States.

CSI Telecommunications, Inc. can assist your organization during the conversion to narrow band. Please contact us at 415-751-8845 or visit our website [www.csitele.com](http://www.csitele.com).





# PUBLIC NOTICE

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## LICENSEES, FREQUENCY COORDINATORS, AND EQUIPMENT MANUFACTURERS REMINDED OF NARROWBAND MIGRATION DEADLINES IN THE 150-174 MHz AND 421- 512 MHz BANDS

This *Public Notice* reminds interested parties of the Commission's deadlines for private land mobile radio services in the 150-174 MHz and 421-512 MHz bands to migrate to narrowband (12.5 kHz or narrower) technology.<sup>1</sup> The Commission directed that a *Public Notice* be issued by December 31, 2009 reminding licensees and frequency coordinators of the approaching deadlines.<sup>2</sup> This *Public Notice* also provides additional information regarding the transition to narrowbanding technology.

### Key Deadlines

*Licensees* and *frequency coordinators* should be aware of the following deadlines:

(1) beginning **January 1, 2011**,<sup>3</sup> the Commission will no longer accept applications for

-new wideband 25 kHz (*i.e.*, operating with only one voice path per 25 kHz of spectrum) operations, and

-modification of existing wideband 25 kHz stations that expands the authorized interference contour (19 dBu VHF, 21 dBu UHF); and

(2) by **January 1, 2013**, Industrial/Business and Public Safety Radio Pool licensees must

- operate on 12.5 kHz (11.25 kHz occupied bandwidth) or narrower channels, or

- employ a technology that achieves the narrowband equivalent of one channel per 12.5 kHz of channel bandwidth (voice) or 4800 bits per second per 6.25 kHz (data).

<sup>1</sup> See Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended; Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies, *Second Report and Order and Second Further Notice of Proposed Rulemaking*, WT Docket No. 99-87, RM-9332, 18 FCC Rcd 3034 (2003); Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended; Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies, *Third Memorandum Opinion and Order, Third Further Notice of Proposed Rule Making and Order*, WT Docket No. 99-87, RM-9332, 19 FCC Rcd 25045 (2004) (*Narrowbanding Third Memorandum Opinion and Order*); see also 47 C.F.R. §§ 90.203(j), 90.209(b).

<sup>2</sup> See *Narrowbanding Third Memorandum Opinion and Order*, 19 FCC Rcd at 25057 ¶ 26.

<sup>3</sup> A petition seeking a stay of the January 1, 2011 deadlines, filed by the National Public Safety Telecommunications Council (NPSTC) on September 29, 2009, is pending. See Wireless Telecommunications Bureau and Public Safety and Homeland Security Bureau Seek Comment on National Public Safety Telecommunications Council Petition for Stay of Interim Narrowband Implementation Dates, *Public Notice*, WT Docket No. 99-87, DA 09-2364 (WTB/PSHSB rel. Nov. 2, 2009).

*Equipment manufacturers* should be aware that, beginning **January 1, 2011**, the manufacture, importation, or certification of any 150-174 MHz or 421-512 MHz band equipment capable of operating with only one voice path per 25 kHz of spectrum will be prohibited; and applications for equipment certification must specify 6.25 kHz capability.<sup>4</sup>

### **Additional Information**

#### **How should licensees notify the Commission that they are in compliance with the January 1, 2013 deadline to migrate to narrowband or narrowband-equivalent technology?**

The answer to this question depends on how and when the station came into compliance.

Licensees of stations that already satisfy the narrowbanding requirements because their authorized bandwidth does not exceed 12.5 kHz do not need to take any action to notify the Commission that the station has met the narrowbanding deadline.

Licensees of stations that currently are authorized to operate with a bandwidth exceeding 12.5 kHz that are transitioning to 12.5 kHz or narrower operation must file a modification application to either add a narrowband emission designator or change the wideband emission designator to a narrowband emission designator.<sup>5</sup> The licensee will not need to take any additional action to notify the Commission that the station has met the narrowbanding deadline. Adding or changing an emission designator for an existing frequency does not trigger a new construction requirement, so the licensee will not need to file a new construction notification.

*Note: Many stations are or will be authorized to operate on their assigned frequencies with multiple authorized bandwidths, including both wideband 25 kHz emissions and 12.5 kHz or narrower emissions. It is not necessary for licensees of such stations to delete the wideband 25 kHz emission designator in order to demonstrate compliance with the January 1, 2013 deadline. Instead, absent information to the contrary, stations that were authorized to operate with both wideband and narrowband emissions prior to January 1, 2013 will initially be presumed to be operating only with narrowband emissions (i.e., that the wideband mode has been disabled) after January 1, 2013. (All equipment certified since 1997 has been required to have a 12.5 kHz operational mode. Licensees should check with their radio equipment vendor to determine how to ensure that the equipment is operating in the 12.5 kHz mode.) The Commission also will have discretion to inquire of licensees to verify that they are operating in compliance with the Commission's rules.*

Licensees of stations that currently are authorized to operate with a bandwidth exceeding 12.5 kHz that have complied or will comply with the narrowbanding deadline by adopting narrowband-equivalent equipment will be required to certify compliance with the deadline. This is necessary because it will not always be apparent from the license's technical parameters whether a 25 kHz station is a non-compliant wideband station or a compliant narrowband-equivalent station. We plan to implement this

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<sup>4</sup> These 2011 deadlines applicable to manufacturers also are subject of the NPSTC petition for stay. The 6.25 kHz requirement does not apply to hand-held transmitters with an output power of two watts or less. See 47 C.F.R. § 90.203(j)(4).

<sup>5</sup> Currently, the Commission's rules require frequency coordination for a modification application that proposes to reduce the authorized bandwidth on the licensed center frequencies, see 47 C.F.R. § 90.175, but the Commission has sought comment on exempting such applications from this requirement. See Amendment of Part 90 of the Commission's Rules, *Notice of Proposed Rulemaking and Order*, WP Docket No. 07-100, 22 FCC Rcd 9595, 9596-97 ¶ 3 (2007).



certification requirement by revising a future version of the relevant application form for new, renewed, and modified station licenses to require licensees subject to the narrowbanding mandate to indicate whether or not the requested operations comply with the narrowbanding requirements. The Commission also will have discretion to inquire of licensees regarding existing licenses for which no such certification is received because the license was not renewed or modified before January 1, 2013.

**Will the Commission take any other action to remind licensees of the upcoming narrowbanding deadlines?**

Yes. In addition to this *Public Notice* and the measures discussed above, the Commission will in the near future begin placing a special condition on all new, renewed, and modified licenses for stations in the radio services and frequencies subject to the narrowbanding mandate to remind licensees of the January 1, 2013 deadline. The special condition will be removed from the license at some point after the licensee notifies the Commission that the station is in compliance with the narrowbanding deadline, as discussed above.

**May a station that does not meet the January 1, 2013 narrowbanding deadline operate after that date on a secondary basis?**

No. As of January 1, 2013, the Commission's rules will prohibit Industrial/Business and Public Safety Radio Pool licensees in the 150-174 MHz and 421-512 MHz bands from operating with wideband channels (unless their equipment meets the narrowband efficiency standard), even if the license still lists a wideband emission designator. Operation in violation of the Commission's rules may subject licensees to enforcement action, including admonishments, monetary forfeitures, and/or license revocation, as appropriate.

**Can previously certified multimode equipment be manufactured or imported after January 1, 2011?**

Yes, under certain circumstances. The equipment certification for previously certified multimode equipment containing a wideband 25 kHz mode will continue to be valid, and such equipment may continue to be manufactured and imported, only if the modes of operation are enabled primarily through software rather than firmware or hardware, and users are not provided with the programming software necessary to activate the wideband 25 kHz mode.

For further information, licensees and frequency coordinators may contact Mr. Melvin Spann of the Wireless Telecommunications Bureau, Mobility Division, (202) 418-1333, [Melvin.Spann@fcc.gov](mailto:Melvin.Spann@fcc.gov), or Mr. Zenji Nakazawa of the Public Safety and Homeland Security Bureau, Policy Division, (202) 418-7949, [Zenji.Nakazawa@fcc.gov](mailto:Zenji.Nakazawa@fcc.gov); and equipment manufacturers may contact Mr. Andy Leimer of the Office of Engineering and Technology, (301) 362-3049, [Andrew.Leimer@fcc.gov](mailto:Andrew.Leimer@fcc.gov).

-FCC-