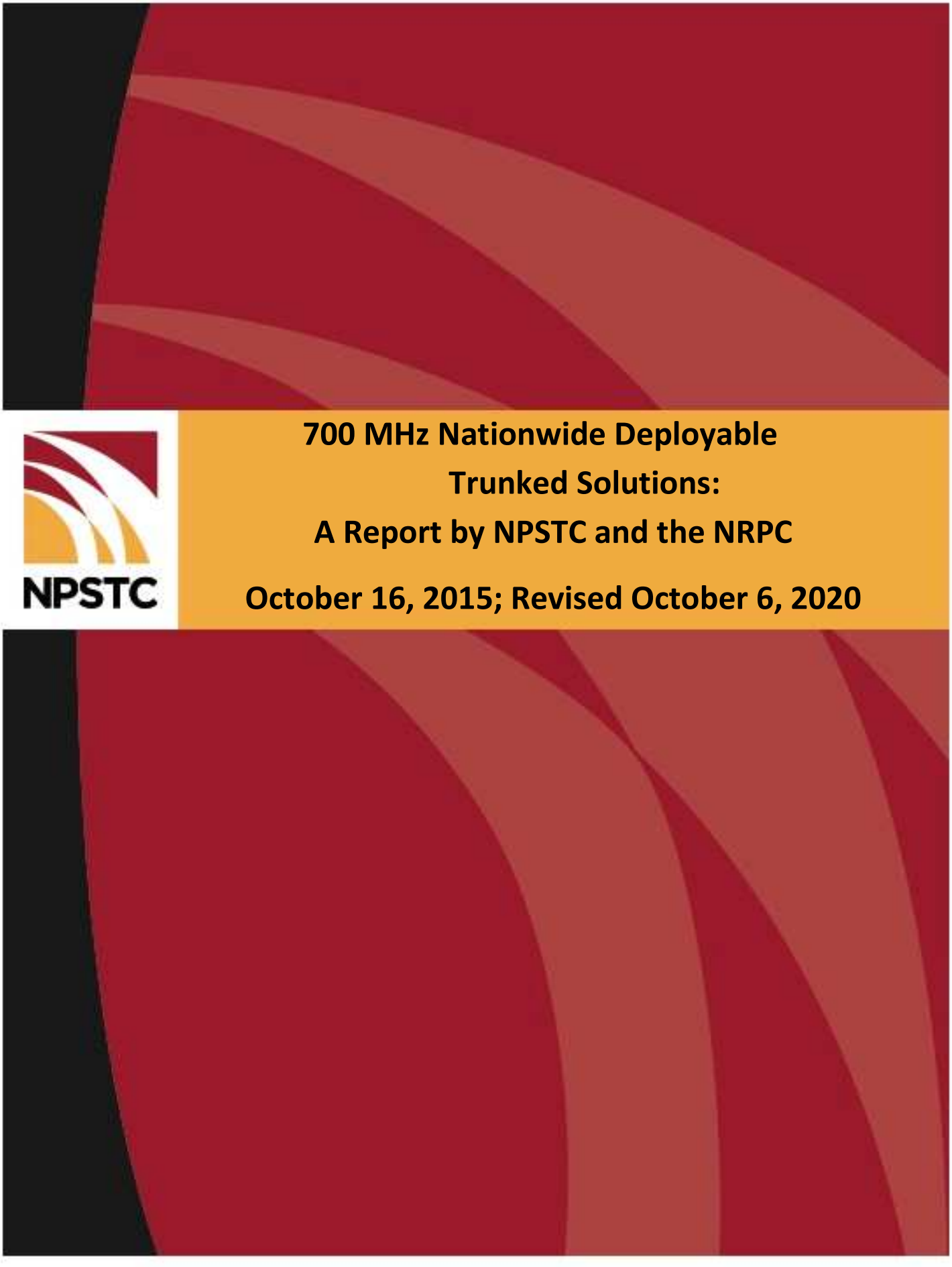

700 MHz Nationwide Deployable Trunked Solutions:

A Report by NPSTC and the NRPC

October 16, 2015; Revised October 6, 2020

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Executive Summary

When major incidents or large planned events occur, public safety entities may need additional personnel at the incident scene beyond those in use on a day-to-day basis. Additional public safety personnel translates to the need for additional communications resources at the scene of a major incident or large planned event as well. Utilizing additional communications resources in turn can require additional radio channels, as well as technical and logistical solutions for ease of deployment.

In 2008, NPSTC petitioned the Federal Communications Commission (FCC) to designate spectrum from the unassigned 700 MHz reserve channels for deployable trunked radio systems. In April 2015, following a multi-step rulemaking process involving numerous 700 MHz issues, the FCC approved six specific 12.5 kHz channel pairs from the 700 MHz reserve spectrum for deployable trunked system use outside T-Band areas.[1] The six specific 12.5 kHz channel pairs are consistent with recommendations NPSTC and the National Regional Planning Council (NRPC) jointly proposed in February 2015, as part of the rulemaking process following the original NPSTC request from 2010. The body of this report provides additional detail regarding the multiple steps required to reach the final decision.

Note: The National Regional planning Council (NRPC) is an advocacy body formed in 2007 that supports public safety communications spectrum management by Regional Planning Committees (RPC) in the 700 MHz and 800 MHz NPSPAC public safety spectrum as required by the Federal Communications Commission. APCO International Automated Frequency Coordination (AFC) division acts as an advocate for the NRPC as well as 700 and 800 MHz regional planning in its creation and continued support of the NRPC Support Office.

As part of the decision the FCC also set a deadline by which Regional Planning Committees (RPCs) must modify their 700 MHz regional plans and determine if they are going to incorporate these six 12.5 kHz deployable trunked system channel pairs into their respective plans. As of the original drafting of this report, that deadline was set at October 30, 2015.

NPSTC and the NRPC believe that local/regional incidents are likely to comprise the majority of deployable system use rather than incidents requiring long distance mutual aid units from outside the region or state. Following the FCC decision in April 2015 that designated the six specific 12.5 kHz channels for deployable trunked systems, NPSTC and the NRPC developed recommended technical and logistical solutions necessary to implement the new deployable trunked systems. These solutions were developed with assistance from the Telecommunications Industry Association (TIA), which provided necessary information on the technical aspects of trunked radio systems, including issues surrounding System IDs that needed to be resolved for deployable systems to enable interoperability.

[1] See Section 1 of this Report for additional details regarding the T-Band area restriction.

After extensive study of the technical and operational issues, NPSTC and the NRPC recommend the overall approach set forth in Section 2 of this report and the specific ID assignment approach described in Section 3. Together, these recommended approaches enable interoperability and help simplify the steps agencies will need to take before placing a deployable trunked system in operation. This report strives to set forth helpful recommendations. Public safety entities that field deployable trunked systems on these channels also will need to work with their respective radio equipment suppliers and regional planning bodies to ensure proper equipment setup and operation.

Follow-up work involving the NRPC Support Office, TIA, and others will be needed to implement the recommended solutions so deployable trunked systems utilizing the six designated 12.5 kHz channel pairs can be placed into actual operation. The goal is to have TIA and NRPC select the necessary Wide Area Communications Network (WACN) ID for nationwide use no later than the end of October 2015 and the Computer Assisted Pre-coordination and Resource Database System (CAPRAD) and upgrades completed by the end of November 2015. If a region requires a System ID prior to completion of CAPRAD upgrades, it should contact the NRPC for assistance.

In late 2019, It was discovered that Intra -WACN auto roaming is implemented through a combination of WACN-ID, System-ID, and SU-ID (Subscriber Unit – ID). In addition, Intra-WACN auto roaming SUs will perform talkgroup (TG) affiliation through a combination of WACN-ID, System-ID and TG-ID for each talkgroup. This creates a problem with teams from out of a given area auto roaming onto a deployable system when the system ID programed into the auto roaming subscriber units does not match the System-ID of the target deployable system. The roaming units are unable to use talkgroups common to the local non-roaming subscriber units. This would hamper response to large incidents that require out-of-area mutual aid response.

In response to this discovery, NRPC/NPSTC reviewed the deployable issue. NRPC and NPSTC representatives worked with the equipment manufacturers to understand the technical factors underlying this issue, and then to recommend the best alternative to address the issue.[2] Section 2 is revised as of October 2020 to incorporate the recommended solution.

1. Dedication of Channels for Deployable Trunked Systems

In 2008, NPSTC petitioned the Federal Communications Commission to adopt rules that would support the nationwide utilization of deployable trunked radio systems.[3] In its petition, NPSTC proposed that all of the 24 Reserve Channels in the 700 MHz band be designated for temporary deployable mobile trunked infrastructure that could be transported into an incident area to assist with emergency

[2] Appendix A was created to document the issue more fully and discuss the alternative solutions to address the issue. This Appendix should now be considered part of the report as reference for those who implement deployable systems and/or program subscriber units to be capable of operating on deployable systems.

[3] Petition for Rulemaking, submitted February 8, 2008. http://apps.fcc.gov/ecfs/comment/view?id=5514991544

response and recovery. NPSTC asserted that such designation would allow 700 MHz licensees to pre-program these channels into their subscriber radios, eliminating the need to reprogram radios in the field or distribute cached radios during a disaster.

On October 24, 2014, the FCC released a Report and Order setting aside up to 8 12.5 KHz channels from the 24 channels in the 700 MHz reserve spectrum outside of the T-Band areas to support these deployable systems.[4] In the T-Band markets, FCC stated that all 24 reserve channels will be available for General Use with priority given to relocating T-Band incumbents that commit to return an equal amount of T-Band channels.[5]

The FCC encouraged the NRPC and NPSTC to identify specific Reserve Channels to support deployable trunked systems on a nationwide basis. Those channels could then be incorporated into regional plans within 3 months from the publication of the 700 MHz Report and Order in the Federal Register. In response to the FCC decision, NPSTC established a joint Task Group with the NRPC to identify these channels and to develop a set of recommended operational strategies that would allow these channels and deployable trunked systems to be used to the fullest extent possible. NPSTC and the NRPC also studied a series of other challenges which would need to be addressed, including the requirement to standardize System IDs and provide for the management of Subscriber IDs.

On February 13, 2015, NPSTC and the NPRC filed a joint letter with the FCC recommending the designation of six channels for nationwide operation of deployable trunked radio systems. This letter also requested an extension of the deadline for the adoption of these channels into regional plans. In selecting the channels for recommendation to the FCC, NPSTC and the NRPC reviewed several sets of channels to determine the best channel spacing (to minimize interference) and to provide coverage at the U.S./Canada and U.S/Mexico border. Only six channels were found to be the most appropriate for assignment to a nationwide channel plan. NPSTC and the NPRC recognized that individual RPCs could add additional channels to this group to create a full complement of frequencies. The U.S./Canada Sharing Sector 2 was the most problematic. Only four of the six channels are available for use by U.S. licensees in this region which impacts areas above Line A in the states of Pennsylvania, New York, and Vermont.[6]

On March 3, 2015, the FCC published a Public Notice seeking comments on the NPSTC/NRPC channel proposal.[7] On April 23, 2015, the FCC approved the six proposed channels.[8] In taking this action, the FCC stated “RPCs may now incorporate these channels into their plans for deployable trunked systems

[4] Report and Order, PS Docket No. 13-87, released October 24, 2014.
[5] See Report and Order, paragraph 40.
[6] Line A defines the southern-most border of a zone within which the U.S. and Canada divide spectrum between the two countries based on treaties and specific spectrum agreements.
[7] Public Notice, DA 15-278, PS Docket No. 13-87 and WT Docket No. 02-378, released March 3, 2015.
[8] Public Notice, DA 15-483, PS Docket No. 13-87 and WT Docket No. 02-378, released April 23, 2015.

provided any region with a T-Band market must give priority to these channels, in that market, to any public safety T-Band incumbent seeking to relocate from the T-Band."[9]

In a related action, on April 20, 2015, the FCC also extended the date by which amended regional plans must be filed with the Commission to October 30, 2015, to include channels for deployable trunked systems.[10] In that decision, FCC treated an NRPC request for an extension as a waiver request and granted a portion of the additional time NRPC requested.

Table 1 shows the set of six channels that NPSTC and the NRPC recommended for nationwide use. These channels were approved by the FCC.

[9] Public Notice, DA 15-483 at page 2.
[10] Order, DA 15-476, PS Docket No. 13-87, released April 20, 2015.

Table 1:

FCC Approved Channels for Interoperable/Deployable Trunked Radio Systems

NPSTC/NRPC Recommended Channel Allocation Deployable 700 MHz Trunked Systems			
700 MHz CH#	FCC Channel Numbers	12.5 kHz Center Frequency	Channel Spacing (kHz)
1	37-38	769.23125	N/A
2	61-62	769.38125	150
3	117-118	769.73125	350
4	141-142	769.88125	150
5	883-884	774.51875 CC-P	4500
6	939-940	774.86875 CC-A	350

CC-P: control channel-primary
CC-A: control channel-alternate

Table 2 shows the geographic and border availability of channels near the Mexico and Canada.

Table 2

NPSTC/NRPC Proposal #1 RECOMMENDED	Common channel selections for each area			
Channels	**Mexico Border Zone**	**Canada Sharing Zone**	**Canada Sector 1**	**Canada Sector 2**
37-38	Y	Y	Y	Y
61-62	Y	Y	Y	Y
117-118	Y	Y	Y	N
141-142	Y	Y	Y	N
883-884	Y	Y	Y	Y
939-940	Y	Y	Y	Y
Total usable	6	6	6	4

2. 700 MHz Transportable Trunked Radio System Operations

Once the channels were allocated by the FCC for nationwide use, NPSTC and the NRPC sought to develop technical and operational solutions that would be required to implement deployable trunked radio networks. While only six channels were identified by NPSTC and the NRPC and subsequently approved by the FCC, public safety agencies can add additional channels through coordination with their respective RPC. It is important to note that when adding additional channels to a local system beyond the six specifically designated nationwide for deployable trunked use, control channels must be selected from the nationwide channel set, specifically channel numbers 5 and 6 in Table 1 designated for control channel use. This is necessary to support interoperability of subscriber devices to all designated deployable systems.

NPSTC and the NRPC, with assistance from TIA, reviewed a number of logistical and technical issues. These included two major components, management of System IDs and management of Subscriber IDs. There were many factors to consider, including the total number of Subscriber IDs that can be supported per System ID, how Project 25 (P25) devices in a deployable network can connect to other systems, and to what extent manual reprogramming of radios might occur.

Single Nationwide System ID

Early discussion in the Task Group centered on the simplicity of assigning a single System ID for all deployable trunked systems that were designed to be fully interoperable. However, only 128,000 Subscriber IDs can be supported per System ID.[11] If a subset of Subscriber IDs were assigned to each state in the U.S. it would provide only about 2,560 IDs for each state. Such a limited number of IDs would not allow for broad adoption of the program throughout the state and would greatly limit the number of radios that could participate.

Therefore, a single System ID would not provide enough Subscriber IDs to all public safety radios that might need to be programmed. Having a single System ID might also cause a variety of problems if more than one transportable system were operating in the same geographic area. Those factors led to the conclusion that a single System ID number would be a poor nationwide solution.

2020 Revision

It was determined that while any given system may only support 128,000 subscriber ID's, the ID's can be any in the range supported by the P25 standards. This means that the 128,000 subscriber ID limit is only the number of units that any one system can support. No practical deployable system will have anywhere close to 128,000 units operating at one time. While it is impractical to manage assignment of unique subscriber ID's to all agencies nationwide, there is a low probability that Unit ID duplication between roaming and local radios operating on a deployable system will occur. Given this, it is

[11] The 128,000 subscriber ID limit is not an inherent limitation of the P25 standard, but it is an upper bound supportable in some equipment.

recommended that a common nationwide WACN ID of BF7CC HEX and a common nationwide System ID of 101 HEX be assigned for use when out of area/region roaming units are required at a given incident.[12] When both roaming and local units need to operate together on common talkgroups, all units will need to manually switch (i.e. manually roam) to a zone that has the standard talkgroup set and a WACN ID HEX of BF7CC and System ID of 101 HEX. Therefore, it is now recommended that a zone be programmed into all subscriber units with the standard talkgroups and the WACN ID of BF7CC HEX and System ID of 101 HEX as described in sections 3 and 4.

Regional/Local System IDs

Each Wide Area Communications Network (WACN) ID can support 4,096 System IDs. Each System ID can support up to 128,000 Subscriber IDs. Therefore, the Task Group discussed the option of assigning a single WACN ID number for all of these systems and allow local agencies to use an individual System ID. This approach seemed to provide the appropriate scale to support deployable trunked systems across the entire U.S. The approach also is consistent with information from TIA that all trunked systems need a unique WACN/System ID combination. While one WACN will be used nationwide, each deployable system will be assigned its own System ID, yielding a unique WACN/SYSTEM ID combination.

NPSTC and the NRPC believe it is unlikely there will be more than 4,096 deployable systems nationwide. Establishing a central entity to assign local and regional systems their own System ID, with Subscriber IDs managed locally by public safety agencies, seems to be a logical approach.

2020 Revision

TIA has clarified that each System ID can support up to 16,777,215 Subscriber Unit IDs, however, implementations may only support 128,000 subscriber ID's active on a given system at any given time. Note also that it is now recommended that a common nationwide WACN ID of BF7CC HEX and a common nationwide System ID of 101 HEX be assigned for use when out-of-area/region roaming units are required at a given incident. Deployable systems intended for local use only (i.e. unplanned out of area/region roaming units are not required) may continue to be assigned its own System ID, yielding a unique WACN/SYSTEM ID combination.

A variety of options are available to manage Subscriber IDs. The use of both Intra-WACN and inter-WACN roaming features may be leveraged to provide interoperable communications between existing fixed trunked systems and deployable trunked systems. These features may require vendor coordination and programming unique to each agency's radio system configuration. Radios that do not support an auto-affiliate feature could be field programmed at the scene of a major incident. NPSTC and the NRPC acknowledge that field programming of trunked radios at the scene is a difficult task. In some cases, it is

[12] To ensure a unique value, this WACN ID value was determined by using the NRPC MFID with the System Number Entity Method found in the "PROJECT 25 GUIDELINES TO ASSIGN WIDE AREA COMMUNICATION NETWORK AND SYSTEM IDENTITIES (2001-04-06). This method also ensures that all System ID values used in combination with this WACN ID value are unique to deployable systems.

preferable to reprogram mutual aid responder radios to access local conventional interoperable resources. Cache radios could be pre-programmed in advance and could also be used to support incoming mutual aid responders. NPSTC and the NRPC recommend that a range of Subscriber IDs be reserved to support roaming users who need manual intervention.

This solution should provide a sufficient pool of Subscriber IDs for each system and can support enough systems and Subscriber IDs to form a viable nationwide solution. Discussion in the Task Group indicated that most of the deployable activity will likely occur in the region of the subscriber/agency and less activity will occur with mutual aid units traveling from outside the region. In any case, those who program radios intended to operate on a particular deployable trunked system will need to know the full hierarchical Subscriber ID, which consists of the WACN ID + the System ID + the individual Unit ID for each subscriber radio.

This solution also accommodates the scenario in which more than one interoperable deployable trunked system is in use at the scene or at different scenes in close proximity to one another.

3. 700 MHz Nationwide Deployable Trunked System ID assignment Process

Under the recommended approach, TIA and the NRPC Support Office within APCO International will coordinate to select a WACN ID to be used nationwide for all 700 MHz deployable systems that utilize some or all of the identified 700 MHz nationwide deployable channels. The systems that utilize these dedicated channels may also utilize additional, regionally approved 700 MHz channels dedicated for deployable use within the applicants' service area in the respective region. The WACN ID assigned to the NRPC by TIA will be a national ID used solely for 700 MHz deployable systems utilizing FCC-designated 700 MHz deployable channels. This in turn provides 4,096 System IDs available for assignment for the deployable systems.

The NRPC will work with the Association of Public Safety Communications Officials – International (APCO) and 700 MHz RPCs to ensure a process is developed within the CAPRAD database that allows the NRPC and 700 MHz RPCs to assign, distribute, and coordinate System IDs under the nationwide WACN from the CAPRAD database that are assigned to applicants seeking to deploy 700 MHz deployable systems in each of the FCC's defined 55 700 MHz regions.

2020 Revision

The WACN ID of BF7CC HEX is assigned now by TIA to NRPC/NPSTC for trunked deployable use. CAPRAD is modified to register assignment of system ID's to agencies or regions. To request assignment of a system ID, send a request to support@caprad.org. The database of assigned and available system ID's can be viewed at www.caprad.org under the 700 MHz menu item.

The following process would be put in place for licensing and coordinating these channels for both applicants and RPCs to follow in implementing systems using one or more of the designated 700 MHz nationwide deployable trunked channels:

When an applicant agency submits a request for a System ID to its respective 700 MHz RPC, the agency can also request a specific System ID be assigned to its deployable 700 MHz system. An applicant may make this request because it wants to minimize complexities that can be encountered in programming radios with multiple System ID values. Utilizing the same System ID for the deployable 700 MHz system that is already in place for an applicant's existing P25 system, albeit it with a different WACN ID, allows for ease of programming for the system administrator that is managing subscribers operating on both systems. If that specific System ID has already been assigned, the applicant will be assigned the next available System ID issued by the CAPRAD system. Subsequently, allowing applicants seeking to implement deployable 700 MHz systems the opportunity to select a specific System ID to operate within the nationwide WACN ID for deployable systems is a benefit to users and should be in the CAPRAD capabilities. As stated earlier, if that System ID is not available, the applicant will be assigned the next System ID from the CAPRAD database.

To ensure each System ID is assigned to one entity only and concurrent requests for System IDs from different regions do not result in duplicate System IDs being assigned, a confirmation email from CAPRAD would be sent to the applicant's email address on file, with a CC to the 700 MHz Regional Chair, confirming the WACN and System ID assigned to that specific system. CAPRAD should allow for a specific System ID to be requested or for the next System ID to be issued, whichever procedure is appropriate for that application.

A list of 4,096 P25 System IDs would be established nationwide within the single Wide Area Communications Network (WACN) issued to NRPC. The list of IDs will be a nationwide master list available for review on the CAPRAD database with a date and timestamp when the System ID was assigned to the applicant. Since use of CAPRAD is "by region," one approach to support this CAPRAD nationwide concept would be to create a new region within CAPRAD called "Nationwide." This new "region" in CAPRAD would house the master list of assigned System IDs that have been assigned to deployable systems on a nationwide basis throughout all 700 MHz regions.

An agency seeking to license a trunked deployable system under this plan will follow its respective Regional Plan licensing requirements. When the application is submitted into CAPRAD, the CAPRAD data system will trigger a request to the RPC to assign a System ID. The NRPC will issue more detailed instructions after CAPRAD is upgraded.

Deployable systems already utilizing interoperability channels under a waiver did not need RPC approval previously, but they will need it for use of the nationwide deployable channels. Instructions to waiver recipients should direct them to their respective regions regarding the application process needed.

4. Recommended Approach

Implementing the recommended approach for IDs requires a set of specific actions and designated entities to take those actions. NPSTC and the NRPC recommend the following approach to implement the recommendation:

1. The NRPC Support Office will work with TIA to allocate a single **WACN ID** assigned for use by all deployable 700 MHz trunked radio systems operating on the FCC-designated deployable channels;

2. The NRPC Support Office will work with the NRPC and RPCs to set up a process to assign **System IDs from the 4,096 System IDs under the designated WACN** to local public safety applicants that are operating or procuring an interoperable deployable trunked radio solution utilizing designated 700 MHz nationwide deployable channels;[13]

3. The NRPC along with the NRPC Support Office will publish a set of best practices and recommendations for the management of these systems. This will include information on assignment of Subscriber IDs, the use the P25 auto-affiliation process (intra-WACN roaming), a common system ID to use in programming common talk group personalities and the need to allocate a range of Subscriber ID numbers to support older model radios. Additional best practices should result from implementations of deployable systems and hopefully will include topics regarding the understanding and assignment of primary and alternate control channels, power levels, and other technical and operational considerations;

4. The NRPC, in coordination with the public safety applicants, also will assign a Network Access Code (NAC) for each nationwide 700 MHz deployable trunked system. Each P25 trunked system has a unique NAC (the P25 equivalent of a tone-coded squelch tone). The purpose of the NAC is to help block out co-channel interference from a receiver. Newer subscribers can auto-learn the NAC by monitoring the trunked deployable system control channel. However, there are some older subscriber radios that will need to have the NAC programmed in. Typically, the NAC is chosen to be the same as the System ID. NPSTC and NRPC recommend this approach. However, applicants and the NRPC will need to take precautions to ensure that the NAC selected for a deployable trunked system is distinct from those used by 700 MHz band non-deployable trunked systems that utilize the same channels in any nearby T-Band

[13] Discussions with TIA indicate that it may be possible to have a "USA System ID" to be programmed into subscribers that would allow for a common system ID to be utilized nationwide, in addition to the deployable trunked system ID that will be assigned to the applicant. This "USA System ID" has been determined to be 101 HEX and is intended for use only by deployable systems that expect out-of-area/region roaming units are required at a given incident. Radios that may be used on such a deployable system should use this System ID value in combination with the WACN ID value of BF7CC HEX to enable manual roaming to such a deployable system. As indicated previously in this report, Public safety entities that field deployable trunked systems on these channels also will need to work with their respective radio equipment suppliers and regional planning bodies to ensure proper equipment setup and operation.

areas. Subsequently, an applicant's awareness of the existing use of NAC codes associated with the use of these deployable channels, whether it is in deployable systems or fixed operation, is critical to the integrity and performance of their proposed deployable system.

5. The NRPC Support Office will distribute a report to 700 MHz RPCs that includes these recommendations, best practices, and copies of the applicable FCC directives to help encourage adoption of this capability.

6. NPSTC and the NRPC Support Office have already conferred with TIA regarding trunked System IDs as part of the process in developing this report and these recommendations. Given that NPSTC and the NRPC Support Office jointly recommend that NRPC and RPCs administer deployable trunked System IDs, the NRPC will take the responsibility going forward for any further work with TIA necessary to vet fully the technical elements of this proposal.

The NRPC Support Office and APCO will work to set up a system to assign Systems IDs in the CAPRAD database, which would record specific information about each system, as follows:

Interoperable Deployable Trunked System Data

Applicant:

Applicant Agency Name:
Applicant Agency Address:
Applicant Agency Contact Name:
Applicant Agency Contact Address:
Applicant Agency Contact EMAIL:
Applicant Agency Contact Phone:
FCC Assigned Call Sign: To be populated in CAPRAD upon issuance of license via CAPRAD's daily FCC update process. The FCC License should be able to be assigned to the agency requesting a System ID in the CAPRAD Master System ID Table manually by the RPC, should the applicant not file its application for deployable channels via CAPRAD's Application Module.

System Information:

System Manufacturer:
System Type:

ID Information: (Assigned by NRPC Support Office)

Common WACN ID Assigned for 700 MHz deployable trunked Use
Unique System ID Number Assigned by 700 MHz RPC to applicant
Numbers Assigned by the respective 700 MHz RPC:
Date Assigned: Date/Time stamp for System ID assignment in CAPRAD.

This information would be recorded in the CAPRAD database. The list of assigned System IDs would be accessible for VIEW-ONLY by any entity. The 700 MHz RPC administrators would have the authority to assign a System ID to an applicant, as necessary.

Agencies that desire to utilize the six designated nationwide interoperable trunked channels would contact the NRPC to obtain the necessary information. The vendor providing the system to the agency will need to program in the correct, WACN ID and System ID. Agencies should contact the NRPC Support Office by phone or email (www.NRPC.US) with questions. A confirmation email response would always be generated to the requester to document the assigned System ID and NAC.

5. Deployable Interoperable Trunk System Talk Group Names

NPSTC and the NRPC Support Office recommend that a common set of trunked talkgroups be created to support these interoperable systems. This would provide the final element to a standardized implementation and should increase operational efficiency at the scene of a major incident.[14]

It is recommended that at least one zone (and preferably two zones) of 16 'channels' be allocated in subscriber equipment. Each zone would be designated by an alpha character at the end of the alphabet ("ZZ", "YY"). This would minimize confusion over local agency assigned zone letters. Each zone would include the following standardized talkgroup names. Tactical talkgroup names were designed to correspond with the channel position in the radio (Tactical talkgroup "ZZ3" is in channel position #3).

[14] TIA advises that the full talkgroup ID should be coordinated among deployable system owners to help enable interoperability.

Zone "ZZ": Primary

Knob Position	Talk Group Decimal ID	Displayed TG ID	Usage
1	101	CALL ZZ	Calling / Initial Contact TG
2	102	CMD ZZ	Pre-designated Command TG
3	103	TAC ZZ3	General / tactical use TG
4	104	TAC ZZ4	General / tactical use TG
5	105	TAC ZZ5	General / tactical use TG
6	106	TAC ZZ6	General / tactical use TG
7	107	TAC ZZ7	General / tactical use TG
8	108	TAC ZZ8	General / tactical use TG
9	109	TAC ZZ9	General / tactical use TG
10	110	TAC ZZ10	General / tactical use TG
11	111	TAC ZZ11	General / tactical use TG
12	112	TAC ZZ12	General / tactical use TG
13	113	TAC ZZ13	General / tactical use TG
14	114	TAC ZZ14	General / tactical use TG
15	115	TAC ZZ15	General / tactical use TG
16	116	EMER ZZ	EMERGENCY use TG

Zone "YY": Secondary

Knob Position	Talk Group Decimal ID	Displayed TG ID	Usage
1	201	CALL YY	Calling / Initial Contact TG
2	202	CMD YY	Pre-designated Command TG
3	203	TAC YY3	General / tactical use TG
4	204	TAC YY4	General / tactical use TG
5	205	TAC YY5	General / tactical use TG
6	206	TAC YY6	General / tactical use TG
7	207	TAC YY7	General / tactical use TG
8	208	TAC YY8	General / tactical use TG
9	209	TAC YY9	General / tactical use TG
10	210	TAC YY10	General / tactical use TG
11	211	TAC YY11	General / tactical use TG
12	212	TAC YY12	General / tactical use TG
13	213	TAC YY13	General / tactical use TG
14	214	TAC YY14	General / tactical use TG
15	215	TAC YY15	General / tactical use TG
16	216	EMER YY	EMERGENCY use TG

Zone "ww": Primary for nationwide system ID 101 HEX

Knob Position	Talk Group Decimal ID	Displayed TG ID	Usage
1	201	CALL YY	Calling / Initial Contact TG
2	202	CMD YY	Pre-designated Command TG
3	203	TAC YY3	General / tactical use TG
4	204	TAC YY4	General / tactical use TG
5	205	TAC YY5	General / tactical use TG
6	206	TAC YY6	General / tactical use TG
7	207	TAC YY7	General / tactical use TG
8	208	TAC YY8	General / tactical use TG
9	209	TAC YY9	General / tactical use TG
10	210	TAC YY10	General / tactical use TG
11	211	TAC YY11	General / tactical use TG
12	212	TAC YY12	General / tactical use TG
13	213	TAC YY13	General / tactical use TG
14	214	TAC YY14	General / tactical use TG
15	215	TAC YY15	General / tactical use TG
16	216	EMER YY	EMERGENCY use TG

The talkgroups become a communications resource that must be managed. The COML should designate what functions would take place on each talkgroup. Talkgroup names are designed to provide the most flexibility. When using the nationwide system ID (101 HEX), all local and out-of-area roaming units should switch to the "ww" zone which allows for common interoperable talkgroup assignment. A COML must be aware that the possibility of duplicate unit ID's is possible with this usage. COML's should request programming resources to mitigate this problem if found.

It is recognized that there is no nationwide designated authority to mandate the use of talkgroup names, just as there is no mandate to use standardized names for nationwide interoperability channels. However, NPSTC and the NRPC Support Office and APCO recommend the RPCs encourage the use of these naming practices and expect local agencies will see the benefit from adopting a standardized approach.

6. Best Practices

Following are some preliminary best practice recommendations for deployable trunked systems operating on the designated 700 MHz channels discussed in this report. Additional best practices may be developed following further discussions within the regional planning community and once additional experience is gained with actual operation of the 700 MHz deployable trunked systems on these channels.

A. Interoperable Deployable System Issues

- Some states or Regional Planning Committees, e.g., Florida and Region 20, are working to build or have developed a master P25 Subscriber ID plan. Subscriber IDs could still match the ID plan that a state or Region develops.

B. Subscriber Device Programming Issues

- When roaming out-of- area to support an incident all units both local and roaming should manually select the “ww” zone. This gives the ability of common talkgroup assignment for all units.
- The System control channel should be allocated to Channel 883-884 [774.51875 MHz] (primary) and 939-940 [774.86875 MHz] (alternate). This is consistent with trunked system operations and allows for geographically closed spaced deployments to operate on separate control channels.
    - The System operating on the (939-940) control channel should use the “YY” talkgroup set when another system is within range operating on the primary control channel / "ZZ" talkgroup set.
    - Single-system deployments would use the “ZZ” talkgroup set, with the option to use the "YY" talkgroup set in addition if required.
    - The Radio System P25 Call Sign Identifier, which is a value derived by combining the WACN and the System ID, should be assigned to transmit on Channel 37-38 769.23125 per FCC Rules CFR 47 Part 90.559 Station Identification.

C. Power Levels

It is incumbent upon all agencies to deploy systems with the power level that provides the coverage, reliability, and spectrum efficiency needed. NPSTC and the NRPC recommend RPCs and agencies planning and utilizing 700 MHz deployable trunked systems limit the 700 MHz deployable trunked system power to no more than 200 watts effective radiated power (ERP). Based on experience, we believe this maximum power level is appropriate. An agency that has unique needs which cannot be met within this power level can work with its respective RPC to request a viable alternative maximum power level.

D. On Scene Operations Use Cases

There are several operational use cases which demonstrate the ability for deployable trunked radio systems to support public safety. These include the ability to provide additional system capacity to support a large event, the ability to activate radio infrastructure in an area that does not have coverage (or which lost coverage due to a disaster event), and the ability to provide supplemental radio coverage at the scene of a major incident. It is important for first responders to be able to access these trunked resources quickly without lengthy or complex radio programming at the scene. The following use cases provide examples of the need for interoperable deployable trunked radio systems.

Use Case #1

Local agency using deployable system to provide coverage at stadium event involving multiple agencies (Planned Event)

A deployable trunked radio system is activated at the university football stadium to provide enhanced radio coverage and support specialized talkgroups for the law enforcement, fire, and EMS personnel working the event. The public safety response to the football game includes multiple agencies in order to provide sufficient staffing for the crowd. All public safety agencies in the region have previously received appropriate radio programming to allow them to access the deployable system. The Communications Unit Leader (COML) reviews the operational plan for the event and assigns the talkgroups for specific functions.

Use Case #2

Local agency using a deployable system following a tornado to support mutual aid units (Unplanned Incident)

A tornado has struck a rural community causing wide-spread destruction and disabling a local public safety radio tower. A deployable trunked radio system has been activated to restore local public safety radio service and to support incoming mutual aid units. All public safety agencies in the region have previously programmed their radios to communicate on the deployable trunked system. Local law enforcement, fire, and EMS units are able to easily switch over to the deployable system and communicate. Incoming mutual aid units are also able to easily access the deployable system.

Use Case #3

Local agency transporting its deployable system to another region to provide assistance at the scene of a major incident (Unplanned Incident).

The local emergency agency has ordered the evacuation of an entire city due to severe flooding and the expected rise of a nearby river. Multiple agencies from the surrounding area are responding to assist as well as agencies from outside the region. A deployable trunked radio system has been placed on elevated terrain near the city to provide coverage to support ambulances which are evacuating a local hospital and two nursing homes. The COML has worked with the Incident Command System (ICS) team and has coordinated with other fixed and deployable systems that are operating in the area. Because all of the deployable systems using the FCC-designated interoperable channels share the same WACN code, many mobile and portable devices may be able to roam onto the radio network without additional programming. All units should manually switch to the nationwide “ww” zone and use the common nationwide system ID.

7. Summary

On April 23, 2015, the FCC designated six 12.5 kHz channel pairs for deployable trunked system use on a nationwide basis outside the T-Band areas, with the exception of U.S./Canada border zone 2, where only 4 of the channel pairs are available. In taking this action, the FCC stated "RPCs may now incorporate these channels into their plans for deployable trunked systems provided any region with a T-Band market must give priority to these channels, in that market, to any public safety T-Band incumbent seeking to relocate from the T-Band."[15]

In a related action, on April 20, 2015, the FCC also set a deadline by which RPCs must modify their 700 MHz regional plans and determine if they are going to incorporate these six 12.5 kHz deployable trunked system channel pairs into their respective plans. As of the drafting of this report, that deadline was set at October 30, 2015. Both of these actions followed multiple steps in a multi-year rulemaking process.

Table 1 described in section 1 of this report shows the set of six channels that FCC approved for deployable trunked systems.

Once the channels were allocated by the FCC, NPSTC and the NRPC Support Office sought to develop technical and operational solutions that would be required to implement deployable trunked radio networks. P25 trunked systems rely on a set of Wide Area Communications Network (WACN) and System IDs for proper operation. NPSTC and the NRPC, with assistance from TIA, reviewed a number of logistical and technical issues including the management and assignment of these IDs for deployable trunked systems using one or more of these six designated channel pair. In short, these technical issues needed to be resolved to enable proper operation and interoperability for these deployable trunked systems using these channels.

Under the plan developed, the TIA and the NRPC Support Office will work together to select a WACN ID and establish a process by which RPCs can assign System IDs to applicants for one or more of the designated nationwide deployable trunked system channels. The CAPRAD data base tool currently used to help manage frequencies will be updated so it also can help manage the assignment and recording of System IDs used for these 700 MHz deployable trunked systems.

Follow-up work involving NPSTC, the NRPC Support Office, APCO, TIA, and others will be needed. The goal is to have the CAPRAD upgrades completed by end of November 2015. If an RPC requires a System ID prior to completion of CAPRAD upgrade, it should contact NRPC for assistance.

In section 5 of this report, NPSTC and the NRPC Support Office also recommend that a common set of trunked talkgroups be created to support these interoperable systems and provide a recommended structure for talkgroup naming. In addition, in section 6 of the Report, NPSTC and the NRPC provide a

[15] Public Notice, DA 15-483, PS Docket No. 13-87 and WT Docket No. 02-378, released April 23, 2015, at page 2.

number of recommended “best practices” regarding the implementation and operation of these 700 MHz nationwide deployable trunked channels.

Finally, NPSTC and the NRPC would like to thank the members of the public safety community and industry who contributed to the development of this report.

APPENDIX A
Deployable Trunked Systems
Intra WACN Roaming Issue
Added in the Revision of October 2020

One of the major goals of public safety communications organizations was to develop temporary and portable trunking systems that could be deployed to the field for an emergency or pre-planned event. A key part of the goal was to enable the deployable trunking system to operate with technical protocols that would support use anywhere in the country by pre-programming subscriber devices. The goal was supported by the Federal Communications Commission ("FCC") and in 2015, the National Regional Planning Council ("NRPC") and National Public Safety Telecommunications Council ("NPSTC") jointly issued a national plan for deployable trunking. In the implementation of the national Plan in one of the Regional Planning Committee areas, a technical problem was discovered that impaired the goal of interoperable deployable trunking.

It was discovered that when programming subscriber units, the units operate as follows when using manual "Intra-WACN Roaming":

> Current radios utilizing "Intra-WACN Roaming" require programmers to define a talkgroup by a combination of a WACN ID, System ID, and talk group (TG) ID for each talkgroup. If subscribers from different areas are programmed to use different System IDs in their programming (as called out by the original NRPC/NPSTC plan), even with all other factors being equal (WACN and TG ID), a problem occurs. The subscribers that are out-of-area radios which auto roam to the deployable system would, upon registration, be assigned a temporary Working TG ID that is different than the Working TG ID used by the radios that have not auto roamed (i.e. have manually roamed) to the deployable system. Because of this, a subscriber (let's call it Subscriber A1) programmed to use TG ID 101 on Deployable Trunked System 00A would not be able to communicate with a subscriber (Subscriber B1) programmed to use TG ID 101 on Deployable Trunked System 00B, even if they both roamed onto the same deployable trunked site, as they would be operating on 2 different talkgroups. The system ID of the deployable system that Subscriber A1 and Subscriber B1 need to operate on should be the same as that for the deployable system on which both units are operating.

To achieve the goal of universal interoperability throughout the United States, consistent universal radio programming is required. One strategy to accomplish the task is to program subscriber devices with the same WACN and System ID in addition to the same TG ID for each talkgroup.

The situation that highlighted this issue would be similar to Use Case 2 from the body of the report. Therefore, the work to develop the 2020 revision included discussion on Use Case 2. The following documents additional information from that discussion.

Assumptions from use case 2, with additional information included from 2020 revision discussions:

1. No ISSI interface is available to any other trunked system
2. Subscriber units are manually switched to one of the two personality/zones specified in the NPSTC/NRPC report. This is referencing report section 5, paragraph 2 which describes one or two zones (ZZ or YY) allocated in (i.e. programmed into) subscriber equipment that is intended to operate on a deployable system.

   The COML will assign a talk group to each user to operate on from the pre-programed pool per the report. The COML of the deployable system will assign each deployable system user to one or more of the 16 ZZ or YY talkgroups described in section 5 of the report.

3. Roaming and home subscriber users need to talk to each other on the common talk groups. A roaming radio refers to a radio that is ordinarily used on some system other than the deployable system, but has manually selected a personality for the deployable system. A home radio is a radio configured for deployable system operation only. A home unit would also manually select the deployable system personality. The home unit is part of the same overall system that owns the deployable system. Because all units have selected the same WACN ID/System ID combination, common Working TG IDs on the deployable system are ensured.

4. See Section 2 of the report – discussion of single vs. multiple system ID. Operationally, it would be best that out-of-area subscribers not require reprogramming in order to operate on the common talk groups. To ensure common Working TG IDs are used on the deployable system, out-of-area subscribers will need to manually select a personality in their radio associated with that deployable system. This results in local and out-of-area radios all using the WACN ID/System ID combination that matches the deployable system.

5. Subscriber units from different manufacturers may be deployed.