



North Carolina Department of Public Safety

State Highway Patrol

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Commander

Support Services
Technical Services Unit

1 July 2024

MEMORANDUM

TO: ALL VIPER PARTNERS AND END USERS

FROM: MICHAEL T. HODGSON, VIPER DIRECTOR

RE: VIPER TDMA UPDATE AND IMPORTANT INFORMATION

As the North Carolina Voice Interoperability Project for Emergency Responders (VIPER) continues to grow, it is important that the system remains at the forefront of the technological improvements afforded to our end users. To maintain our technological timelines and to be able to make the most efficient use of the resources that we have available, VIPER must begin to address our ability to implement new capabilities to ensure that we are ready for not only the continued growth of the system but also for future system enhancements.

Under our current Project 25 (P25) system architecture, we support digital operation using the Frequency Division Multiple Access or FDMA technology. With the implementation of the GTR base stations, VIPER became able to support P25 Phase 2 operation utilizing Time Division Multiple Access or TDMA operation. TDMA allows us to divide each channel on the system that supports voice radio traffic into two separate talk “paths”, each supporting a unique voice radio conversation. This capability will allow VIPER to potentially support more concurrent voice conversations without adding additional base stations to address the need for growth. In the 10 years since we migrated to P25 in June 2014, the VIPER system has grown from 65,565 to over 185,000 user devices and continues to grow every day.

A transition to TDMA is still a year away and hopefully all our end users’ agencies are well under way in the replacement of their non TDMA capable radios.

VIPER first provided a roadmap with certain steps on **1 July 2019**. The original intent was to allow state and local agencies to have six fiscal budget years to prepare for the upcoming transition to P25 Phase 2 (TDMA) operation on the VIPER system. Below are the two most important dates that are relevant today.

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- Effective 1 July 2022 all radios being added to the VIPER system must be ready to receive TDMA programming. It is extremely important that our end users understand exactly what this means. Many manufacturers' radios may be capable of TDMA operation but were not ordered with the "feature" enabled from the factory. These radios will need to be modified in the field to add the TDMA feature, to be "ready" for a transition to TDMA in the future.
- **Effective 1 July 2025 all radios currently active on the VIPER system, along with all future additions to the system shall be ready to receive TDMA programming.**

VIPER respects that these dates may represent challenges to our end users, especially around funding since replacement radios or upgrades to existing radios will be necessary. However, it is important to consider that the system continues to grow and to maintain VIPER's current level of system busies, that a move to TDMA operation would be the most effective way to address future growth and system health.

VIPER has created a new email address specifically for TDMA related questions regarding this memorandum and any other VIPER TDMA related items. Please utilize viper-tdma@ncshp.gov for any TDMA related inquiries.

VIPER TDMA Testing

In anticipation of the upcoming July 1, 2025, activation of TDMA (P25 Phase 2), VIPER has been diligently working to allow end-user and radio service shop programmers to start testing and verification. To that end, we have enabled TDMA on a select number of sites distributed across the state. Please see attached file showing the footprint of the sites providing TDMA capabilities for testing. Please note that this coverage footprint is approximate.

In cooperation with North Carolina Emergency Management, the State Event talk groups Tango 1, Tango 2, Tango 3 and Tango 4 have been set at the system level to ONLY support TDMA calls, and radios will only be able to affiliate with sites that support TDMA.

These talk groups have been removed from the assignment rotation for state incidents by the 24-Hour Watch and are NOT monitored by the Watch nor any communications center.

Users may utilize these talk groups to test communications but do be aware that you may hear others testing as well.

Also attached is the guide sheet previously distributed for most of the radio manufacturers for configuration of the radios for proper TDMA operation.

If questions on other vendor radios arise or other questions on the operation of TDMA, please direct email inquiries to viper-tdma@ncshp.gov

VIPER TDMA

Testing Footprint



VIPER TDMA Programming information

The Following channel plan will be in use for VIPER going forward to support the ultimate change to TDMA operation:

Entry #	Channel Type	Base Frequency	Offset Direction	Offset	Channel Spacing
1	FDMA	851.00625	-	45.00000 MHz	6.250 kHz
2	FDMA	762.00625	+	30.00000 MHz	6.250 kHz
3	TDMA	851.01250	-	45.00000 MHz	12.50 kHz
4	TDMA	762.00625	+	30.00000 MHz	12.50 kHz

Below are more specific details for Motorola, JVCKenwood/EFJ, Kenwood, and Harris radios

Motorola APX

Under Trunking System, the below Channel plan should be configured as follows:

▼ ASTRO 25 Channel ID						
Position	Identifier Enable	Channel Type	Transmit Offset Sign	Transmit Offset (MHz)	Channel Spacing (kHz)	Base Frequency (MHz)
Channel ID 1	<input checked="" type="checkbox"/>	FDMA	-	45.00000	6.250	851.00625
Channel ID 2	<input checked="" type="checkbox"/>	FDMA	+	30.00000	6.250	762.00625
Channel ID 3	<input checked="" type="checkbox"/>	TDMA	-	45.00000	12.500	851.01250
Channel ID 4	<input checked="" type="checkbox"/>	TDMA	+	30.00000	12.500	762.00625

Also under the Trunking system, the tick-box for “Phase 2 Voice Capable” must be checked.

▼ ASTRO 25	
Motorola Proprietary Features	<input checked="" type="checkbox"/>
ISP Sequence Length (sec)	5
Maximum Slot Size (ms)	45
Force Unmute Time (ms)	1200
Quick Fade Protect (ms)	300
PTT Warning Time (ms)	750
Busy Update Time (sec)	30
Response Pending Time (sec)	6
Default RCM ID	16777212 - FFFFC
Phase 2 Voice Capable	<input checked="" type="checkbox"/>
Validate NAC Against System ID	<input checked="" type="checkbox"/>
WUID Validity Support	<input type="checkbox"/>

JVCKenwood/EFJohnson Armada

For Armada-based radios (VP Series), the Channel ID list, located under **Systems** -> **“VIPER”** -> **Lists** -> **Channel ID** needs to be configured as shown below.

The screenshot shows the configuration interface for the JVCKenwood/EFJohnson Armada system. The 'Systems' tab is selected, and the 'VIPER P25' system is chosen. The 'Channel ID' option is selected under the 'Lists' menu. The 'Channel ID List' table is displayed with the following data:

No.	Channel Type	Tx Offset Sign	Tx Offset (MHz)	Spacing (KHz)	Base Frequency (MHz)
<input checked="" type="checkbox"/> 1	FDMA (12.5 KHz)	-	45.00000	6.25	851.00625
<input checked="" type="checkbox"/> 2	FDMA (12.5 KHz)	+	30.00000	6.25	762.00625
<input checked="" type="checkbox"/> 3	TDMA (6.25 KHz)	-	45.00000	12.50	851.01250
<input checked="" type="checkbox"/> 4	TDMA (6.25 KHz)	+	30.00000	12.50	762.00625

Kenwood KPG-D1N

For Radios programmed with Kenwood KPG-D1N (NX-Series), the Trunked Channel Plan, located under **P25 Network** -> **“VIPER”** -> **Trunked Channel Plan** should be configured as shown below.

The screenshot shows the configuration interface for the Kenwood KPG-D1N system. The 'P25 Network - Trunked Channel Plan' is selected. The 'Network Number' is 1 and the 'Network Name' is 'VIPER P25'. The 'Trunked Channel Plan' table is displayed with the following data:

ID	Base Receive Frequency [MHz]	Base Transmit Frequency [MHz]	Transmit Offset [MHz]	Bandwidth [kHz]	Channel Spacing [kHz]	Channel Type
1	851.006250	806.006250	-45.000000	12.5	6.25	FDMA
2	762.006250	792.006250	+30.000000	12.5	6.25	FDMA
3	851.012500	806.012500	-45.000000	12.5	12.50	TDMA
4	762.006250	792.006250	+30.000000	12.5	12.50	TDMA

Harris RPM2

For Radios programmed with Harris RPM2, the below settings need to be made:
Under Sets, a Channel IDEN set should be created with the following information:

VIPER-XL200-1 > Sets > Default Channel IDEN > VPR TDMA

*Name

Create

#	Incomplete	Base Frequency (MHz)	TX Offset (MHz)	Channel Spacing (kHz)	Bandwidth (kHz)	Type
01		851.00625	-45.0000	6.25	12.500	FDMA Full Rate
02		762.00625	30.0000	6.25	12.500	FDMA Full Rate
03		851.01250	-45.0000	12.5	12.500	TDMA 2 Slot
04		762.00625	30.0000	12.5	12.500	TDMA 2 Slot

Under the P25 system that is defined for VIPER, under the **System Options -> Sets Options -> Default Channel IDEN Set**, the IDEN set created above should be selected.

VIPER-XL200-1 > Systems > P25 Trunked > VIPER

System Options

Sets Options

* Trunked Frequency Set

* Group Set

Phone Call Set

Individual Call Set

* Default Channel IDEN Set

Custom Scan List

Encrypted Data Configuration

Power

Security Key

LCD Display

Control Channel Modulations

Under the P25 system that is defined for VIPER, under Miscellaneous Options, the tick-box for “TDMA Capable” should be enabled.

Miscellaneous Options

<input checked="" type="checkbox"/> Emergency Display	<input checked="" type="checkbox"/> Emergency Audio	<input type="checkbox"/> Send Emergency Alarm	<input type="checkbox"/> Emergency User Only Ctr
<input checked="" type="checkbox"/> Control Channel TX Request	<input type="checkbox"/> VDOC Capable	<input checked="" type="checkbox"/> TDMA Capable	<input type="checkbox"/> HVD-TDMA Capable
<input type="checkbox"/> Vehicular Repeater Activation	<input checked="" type="checkbox"/> Linear Simulcast	<input checked="" type="checkbox"/> Avoid Failsoft	<input type="checkbox"/> Keyback On Ann
<input type="checkbox"/> Confirmed TX	<input type="checkbox"/> Refresh ProScan Adjacency List	<input type="checkbox"/> Adaptive Filter	<input type="checkbox"/> Radio Unit Monitor
<input type="checkbox"/> Prioritize InBand Alias	<input type="checkbox"/> Confirmed Unmute Delay	<input type="checkbox"/> Data Inhibit	<input type="checkbox"/> System Name Toggle With Site Name