Programming Manual
Motorola Dx2000 and Dx4000 series Radios

Version 0.2 | April 2021

Telecommunications Security Standards {TESS+}
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Table of Contents

Introduction

This manual is intended to use by radio technicians who are familiar with similar types of Motorola equipment. It contains service information required for the equipment described that gives technicians the technical knowledge of how to program radio equipment properly.

In this Guide

This programming manual covers the basic operation of programming MOTOTRBO radios that are using selective calling (SelV). It provides guidance on using the Customer Programming Software (CPS) for programming Motorola two-way radios.

Technical Support

Technical support is available to assist the technician in resolving any malfunction which may be encountered. Initial contact should be by electronic mail or opening a ticket wherever possible. When contacting Technical Support, be prepared to provide the product model number and the serial number of the unit.

Training

Contact {TESS+} or the ETC training teams.

Radio models covered by this manual

Handheld radios

Motorola DP2400e *Features*: No keypad / display Available in VHF / UHF Supports up to 16 channels *Recommended for:* Network users	
Motorola DP4801 / DP4801e *Features*: Full keypad and display Available in VHF / UHF Supports up to 1000 channels *Recommended for:* Network users Network controllers	

Base / Mobile radios

Motorola DM2600 *Features*: Keypad / display Available in VHF / UHF Supports up to 160 channels Basic microphone included *Recommended for:* Network users Network controllers (keypad microphone must be added)	
Motorola DM4601 / DM4601e *Features*: Keypad / display Available in VHF / UHF Supports up to 1000 channels Keypad microphone included *Recommended for:* Network users Network controllers	

Items needed for programming

Programming Cables

Motorola DP2xxx series radios PMKN4115B	
Motorola DP4xxx series radios PMKN4012B PMKN4012C *Note*: The PMKN4012A cable does not work with this series	
Motorola DM2xxx series radios PMKN4147A	
Motorola DM4xxx series radios HKN6184C	

Programming Software

Motorola Customer Programming Software CPS 16 ***Applicable radios***: <*.ctb file extension / Radios on pre-R2.4.0 firmware and older are supported> ***Operating systems***: Windows 7 and up	MOTOTRBO CPS
Motorola Customer Programming Software 2.0 ***Applicable radios***: <*.ctb and *.ctb2 file extensions / Radios on pre-R2.4.0 firmware and older are not supported> ***Operating systems***: Windows 7 and up	MOTOTRBO CPS 2.0

Contact tess@wfp.org for guidance on how to access the programming software.

UN standard Motorola codeplugs

	Network user codeplug ***Features***: Able to send PTT-ID and emergency calls
	Network controller codeplug ***Features***: Able to send stun, un-stun and silent interrogate.

|	
⚠	The Network controller codeplug contains features that, when used incorrectly, can seriously disrupt network operations. Make sure to program this codeplug in Network controller radios only!

Check with your colleagues or email tess@wfp.org to request a copy of the standard codeplug.
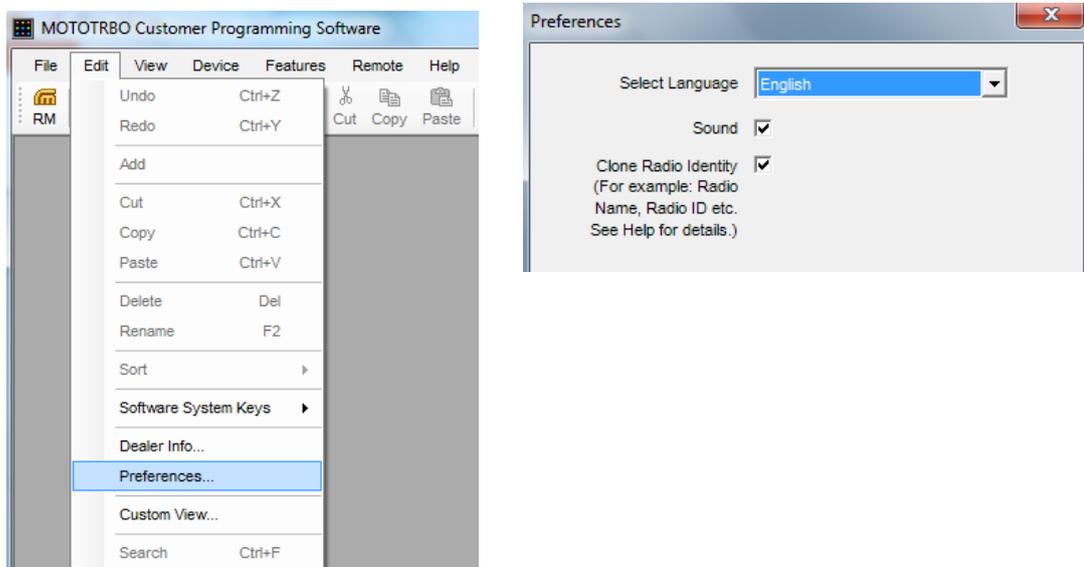
Configuring the Motorola CPS software

Motorola CPS 16.0

Once the CPS has been installed on your computer, open it and make the following changes:

Open the CPS, and then click **View** ▶ **Expert**.
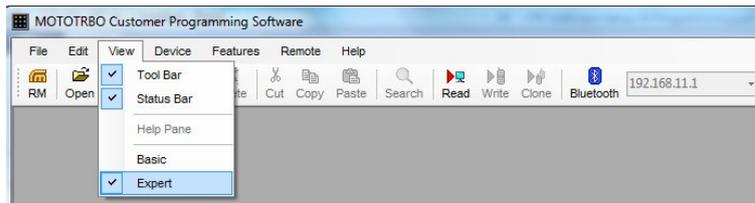
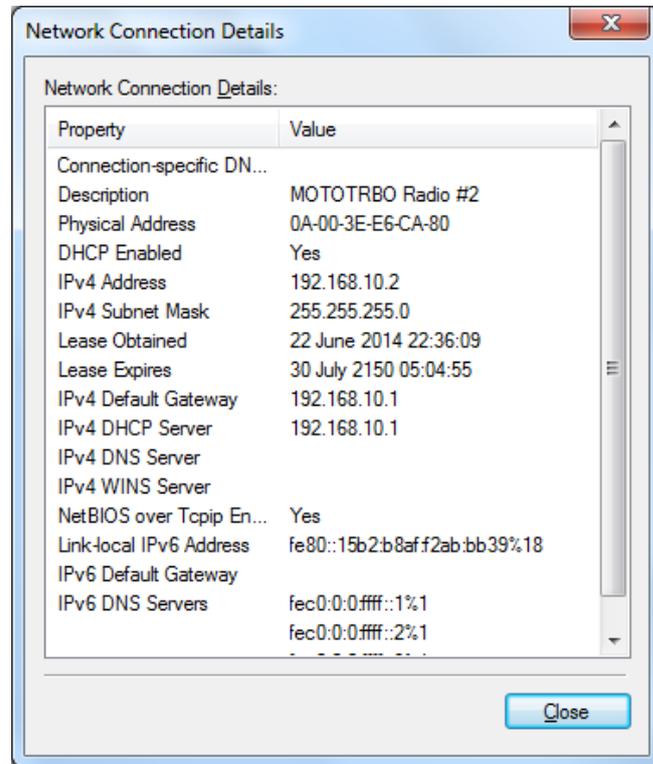Click **Edit/Preferences**, and then select **Clone Radio Identity**.

Motorola CPS 2.0

There are no settings needed for admin functions and clone functions in CPS 2.0.

Connecting the Radio to the CPS

o   Connect your radio via the appropriate USB cable (as specified above) to your computer.

The radio contains a DNS server, and so will appear as a new network connection. An IP address of 192.168.10.2 is assigned to your machine, the radio will have an IP address of 192.168.10.1

Programming radios

Reading, Writing and Cloning

|	
ℹ	Check with your colleagues or contact TESS@wfp.org for the password for the standard code plugs.
⚠	Make sure of the following points before programming any radio: 1- Connect your computer to UPS or a fully charged laptop. 2- Use UPS to program base stations and make sure the vehicle battery is okay when programing mobile stations. 3- Portable battery should be over 70% charged before programing. 4- Do not unplug the USB cable during reading, writing and cloning code plugs.

Motorola CPS 16.0

Reading the radio

Click on the **Read** icon once the radio has been connected to the computer and the IP address has been assigned to the radio. Enter the password to open the radio codeplug (check with your colleagues or email tess@wfp.org for the password).

Writing the radio

Write is used to send a configuration or codeplug to the radio when the serial number in the codeplug or archive is the same as in the radio you are programming. For example, you read the codeplug from the radio, edit it, and write back to the same radio.
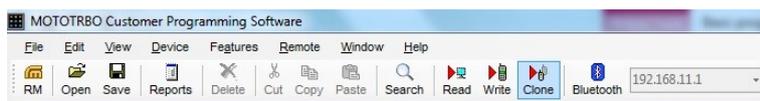

You will then see the following message:
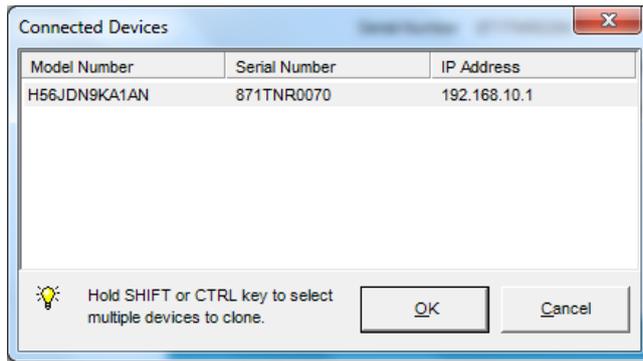
If the serial numbers on the codeplug and the radio do not match, you will see the following error message because the codeplug you are trying to use was not read from this radio. In such cases, you need to perform a "clone" operation.


Cloning the radio

Clone is used to send a configuration or codeplug to the radio when the serial number in the archive is different from the radio you are programming. For example, you have read a codeplug from one radio, you then edit the callsign and SelectV ID, and you now want to send this configuration to another radio.

When using the standard codeplug for your area, you use the clone feature to programme a new radio.

If the codeplug version of your radio does not match the codeplug version for the archive you are writing, you will see the following error message. Note that this is not a problem. You can still proceed with writing the configuration to the radio.
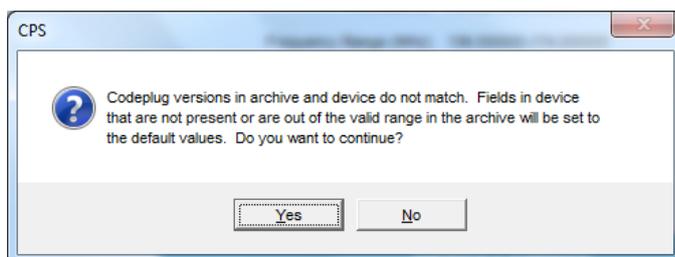
Updating the Call Sign and SelV ID in radios.

Open the UN standard codeplug that matches your radio model (check with your colleagues or email tess@wfp.org to request a copy of the standard codeplug). Each time you need to program a new radio you will need to assign a new callsign with a matching SelectV ID. Recorded the ID in a central database so that there is no duplication as per your current SelectV analogue radio standard.

o   Open the standard codeplug.

Click **General Settings** ▸ **Radio Name** to insert the allocated callsign.
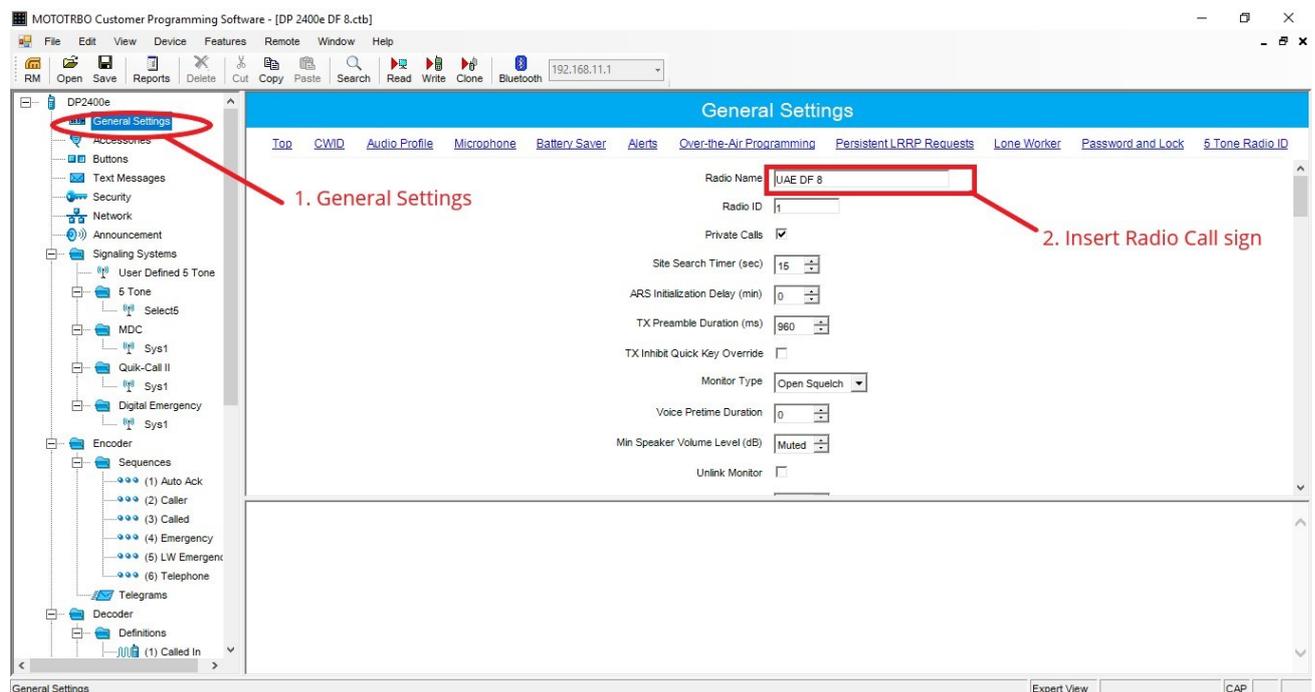
Scroll to the bottom of the General Tab and edit the 5 Tone Radio ID.
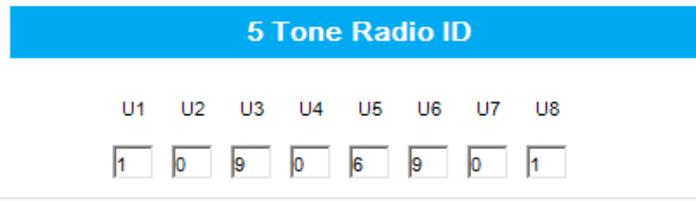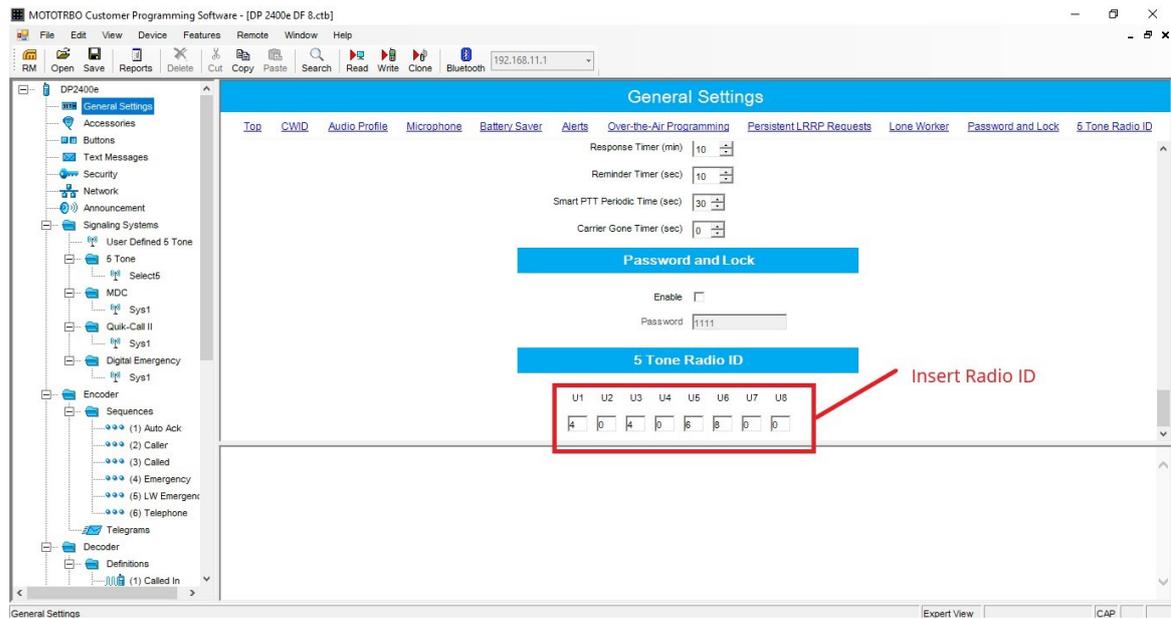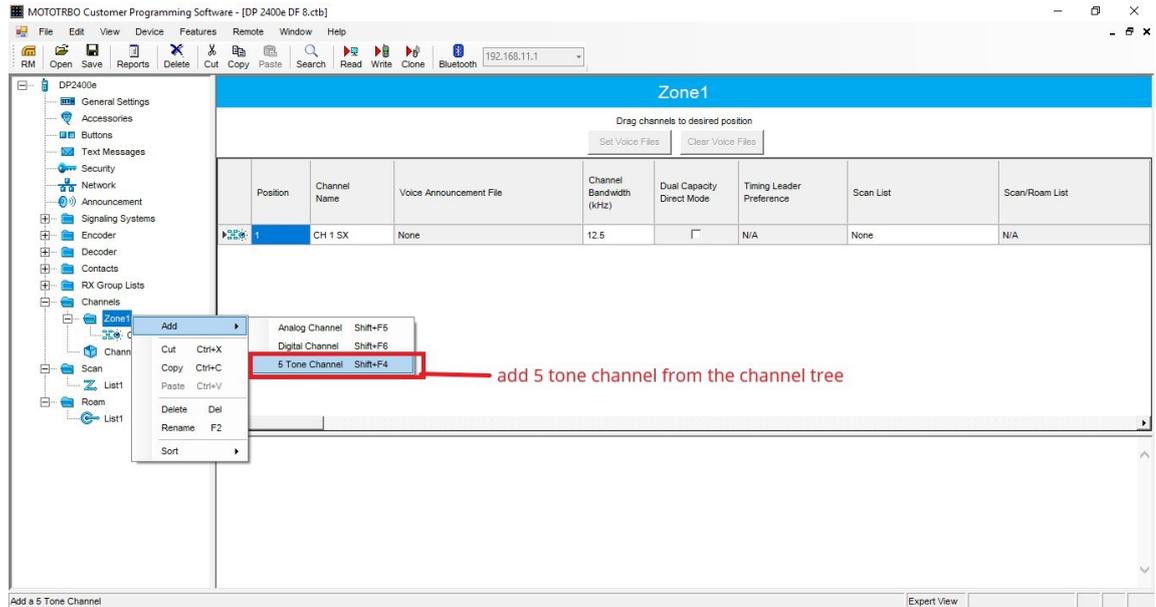
You have now edited all necessary fields to use the radio in SelV analogue mode.

If the serial number of the codeplug matches with the radio, write to your radio, else clone the radio.

# Adding channels to the UN standard codeplugs.

Update the Channel details.

Open the standard codeplug, and then select **Channels** ▸ **Analogue Network** ▸ **Add** ▸ **5-Tone Channel**

- o Choose **Channel bandwidth** (12.5 kHz is the standard)

- o Update the **TX and RX Frequencies**, **Squelch Type** and **TPL Frequency** as per the current analogue standards.
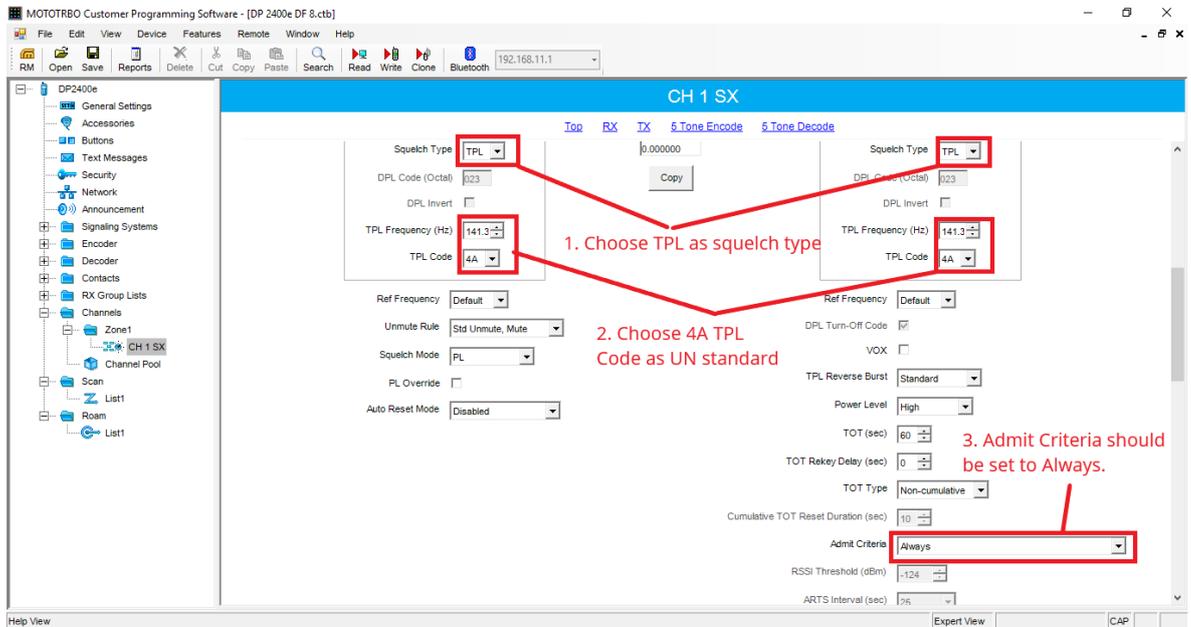
| ⚠	Do not copy/paste the channels from one codeplug into another. Edit the below details individually when adding frequencies. The reason for this is that there can easily be mistakes when copy/pasting settings.
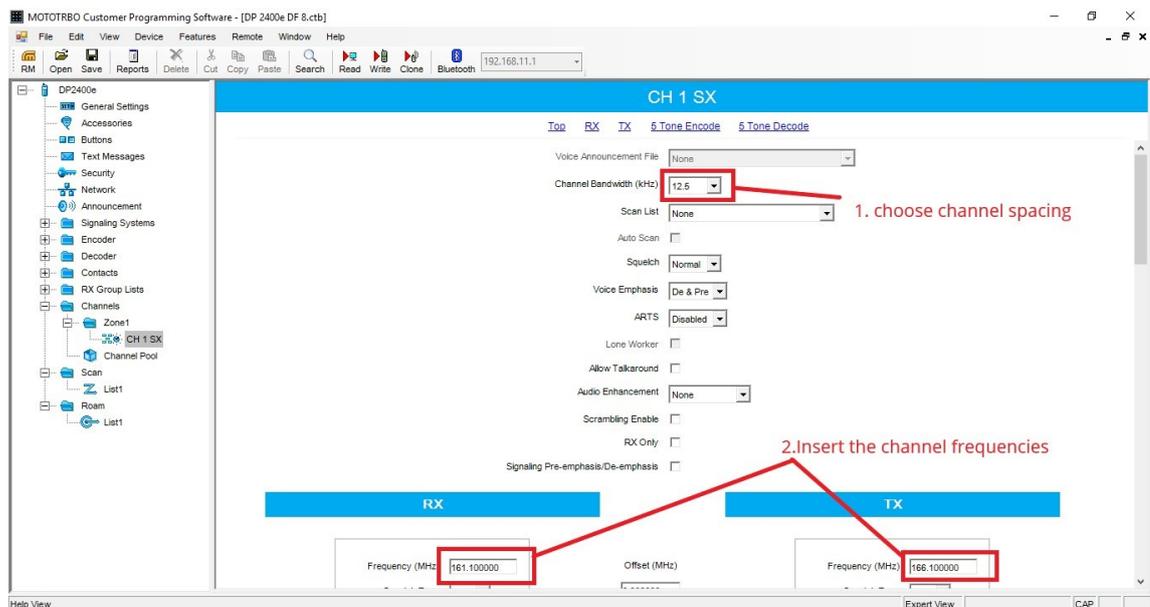
- o Choose **TPL** as **Squelch Type**

o   Choose **TPL code 4A, 141.3 Hz** (UN standard)

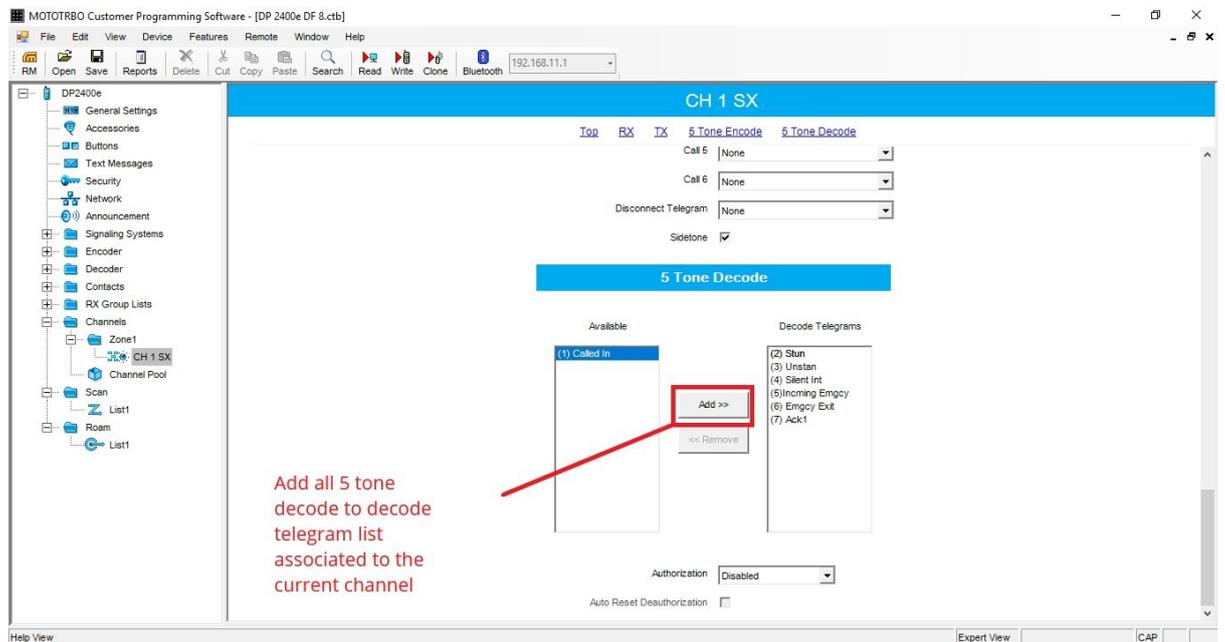o   Choose **Admit Criteria** should be set as **Always.**
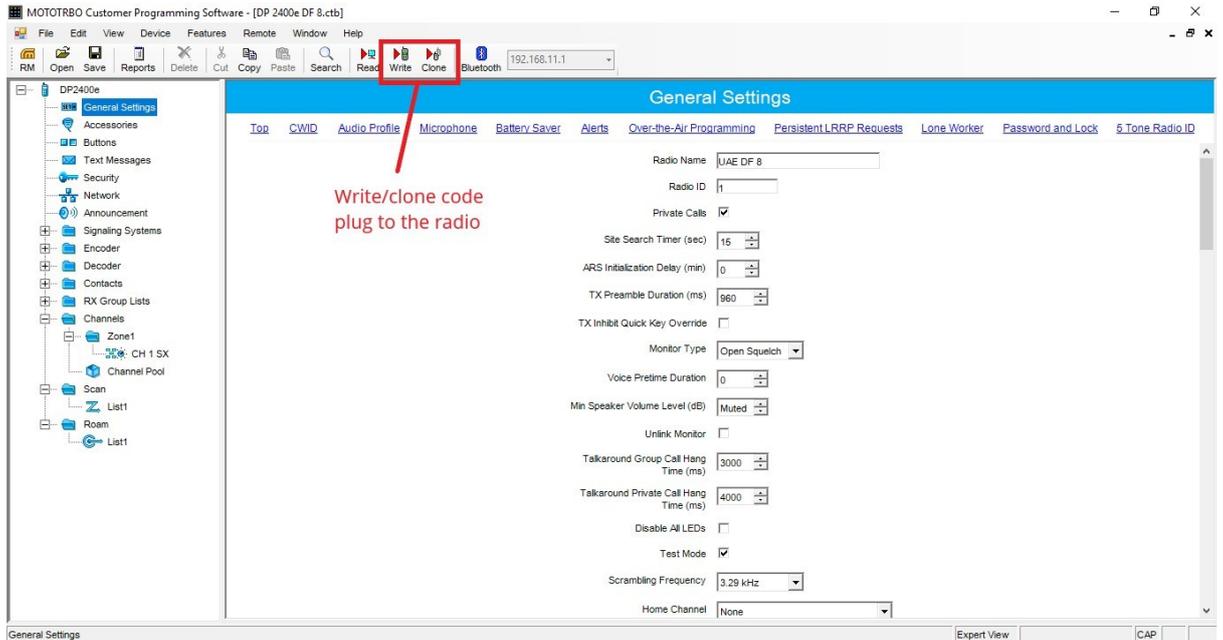

o   Change **Encoder Hold Time** to 0:

o   Choose **Tel3** as **Call 1** in the **5-Tone Encode** settings:
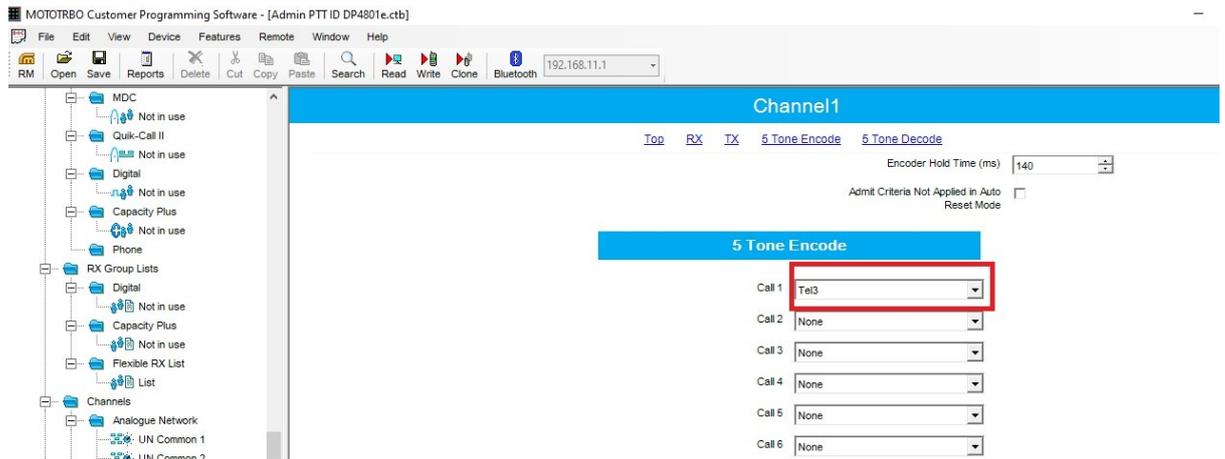
o   Add the **SelV** functions to the **Decode Telegrams**:

Write alt. **Clone** radio.
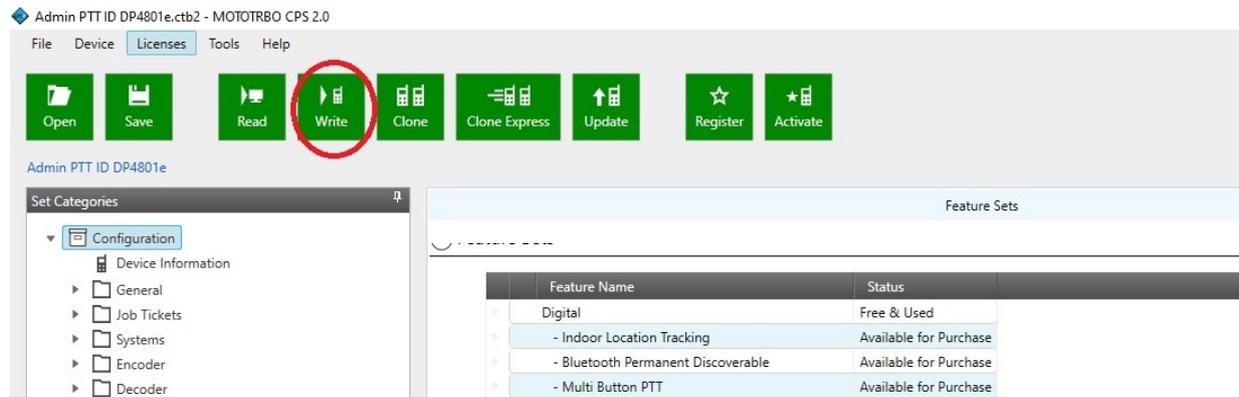
Motorola CPS 2.0

Reading the radio

Click on the **Read** icon once the radio has been connected to the computer and the IP address has been assigned to the radio.

Enter the password to open the radio codeplug.
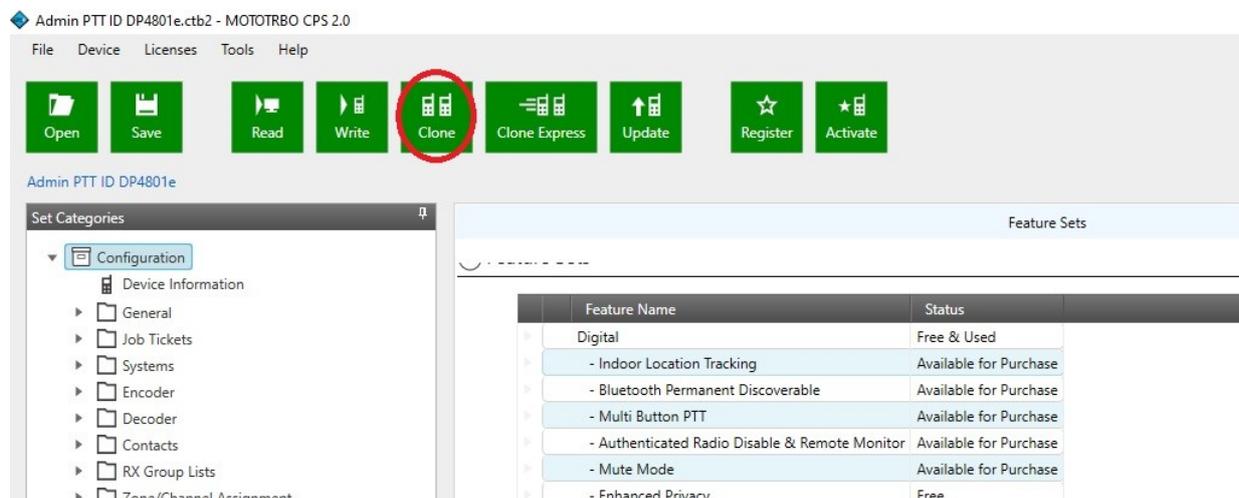
Writing the radio

Write is used to send a configuration or codeplug to the radio when the serial number in the codeplug or archive is the same as in the radio you are programming. For example, you read the codeplug from the radio, edit it, and write back to the same radio.

Cloning the radio

Clone is used to send a configuration or codeplug to the radio when the serial number in the archive is different from the radio you are programming. For example, you have read a codeplug from one radio, you then edit the callsign and SelectV ID, and you now want to send this configuration to another radio.

When using the standard codeplug for your area, you use the clone feature to programme a new radio.


If the codeplug version of your radio does not match the codeplug version for the archive you are writing, you will see an error message. Note that this is not a problem. You can still proceed with writing the configuration to the radio.

Updating the Callsign and SelV ID in radios.

Open the UN standard codeplug that matches your radio model. Each time you need to program a new radio you will need to assign a new callsign with a matching SelectV ID. Record the ID in a central database so that there is no duplication as per your current SelectV analogue radio standard.

o   Open the standard codeplug.

Click **General** ‣ **General Settings** ‣ **Radio Alias** to insert the allocated callsign.
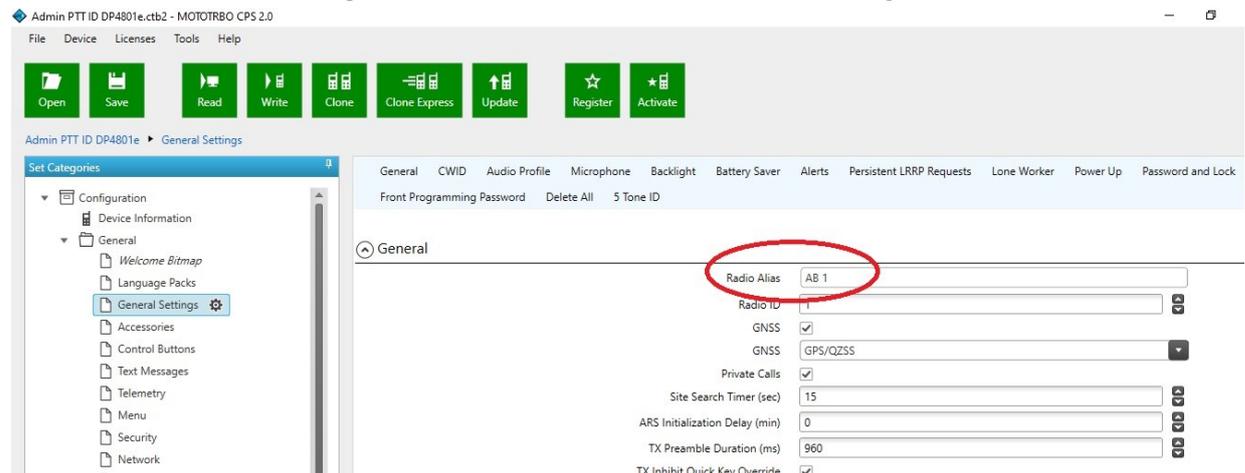
o   Scroll to the bottom of the General Settings and edit the **5-Tone Radio ID**.
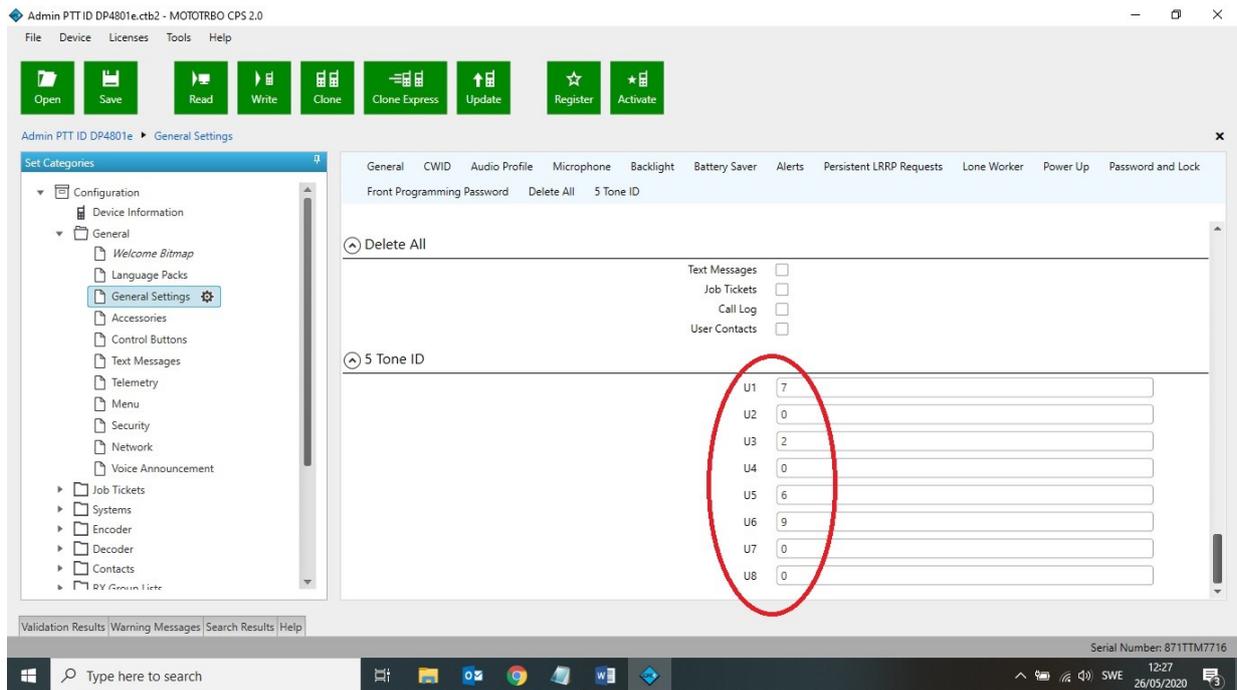
You have now edited all necessary fields to use the radio in SelV analogue mode.

If the serial number of the codeplug matches with the radio, write to your radio, else clone the radio.
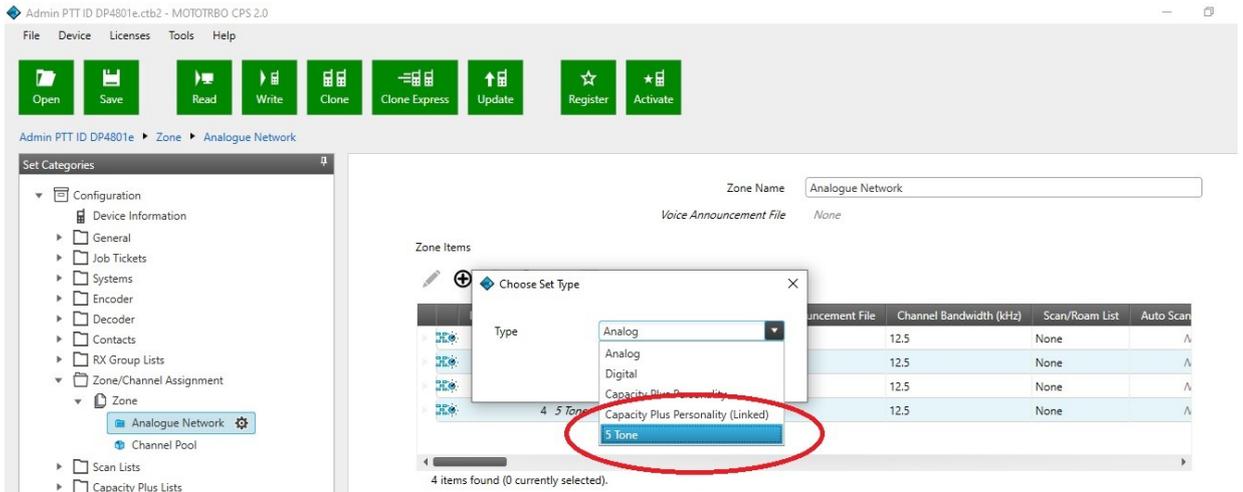
Adding channels to the UN standard codeplugs.

Update the Channel details.

o   Open the standard codeplug, and then select **Zone/Channel Assignment** ▸ **Zone** ▸ **Analogue Network** ▸ **Add**
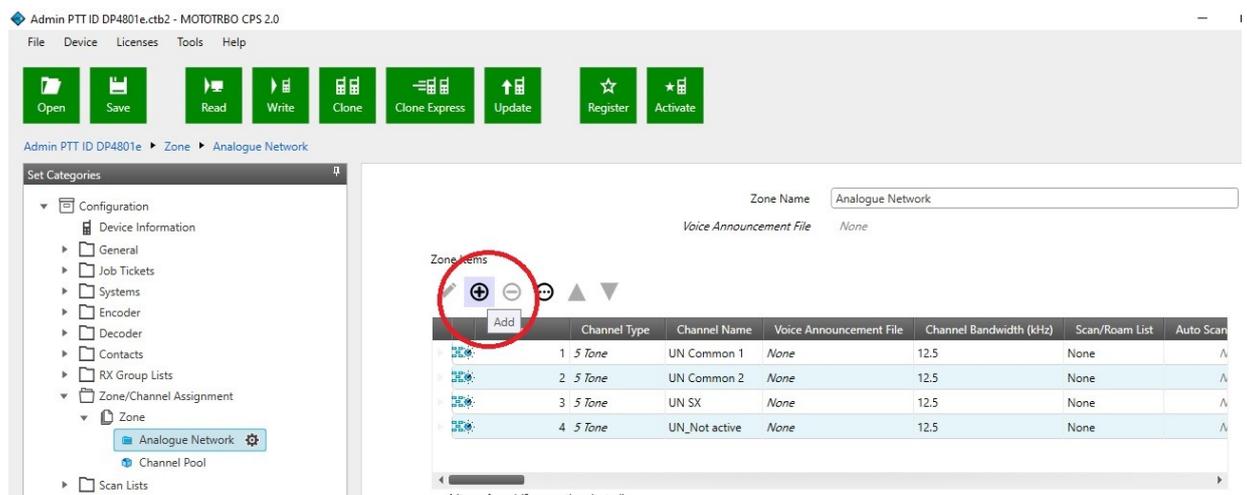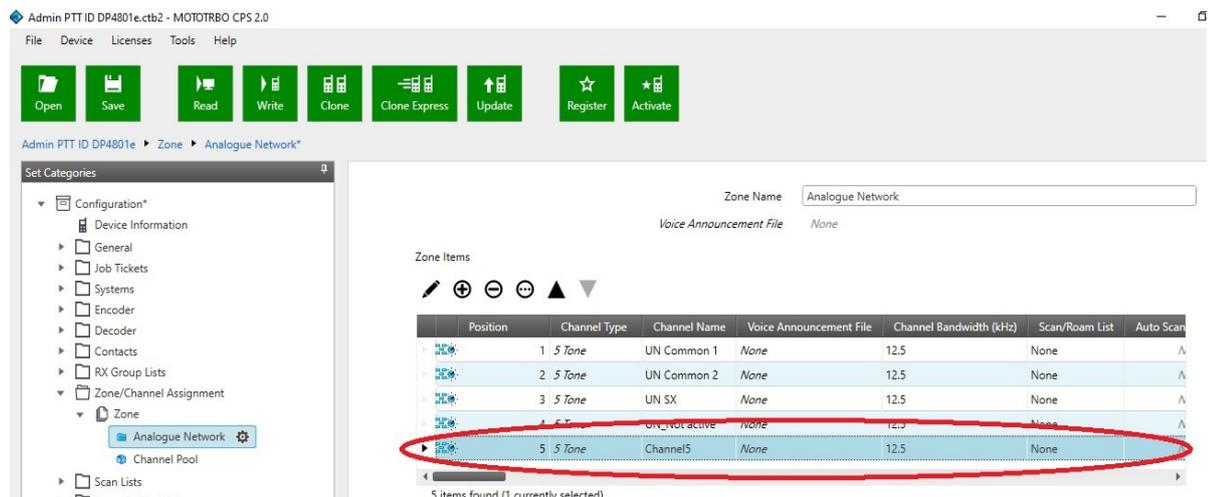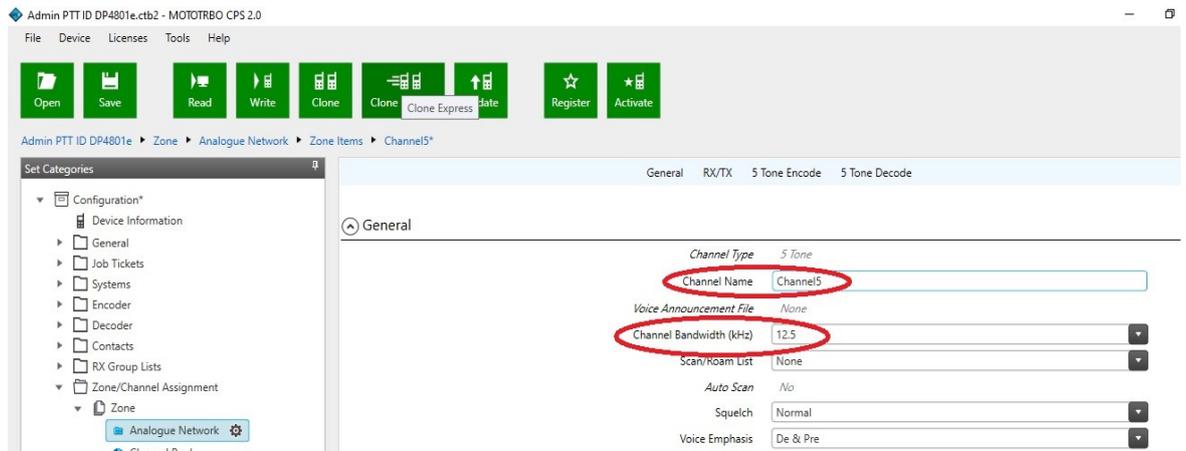

o   Choose Set Type **5-Tone**

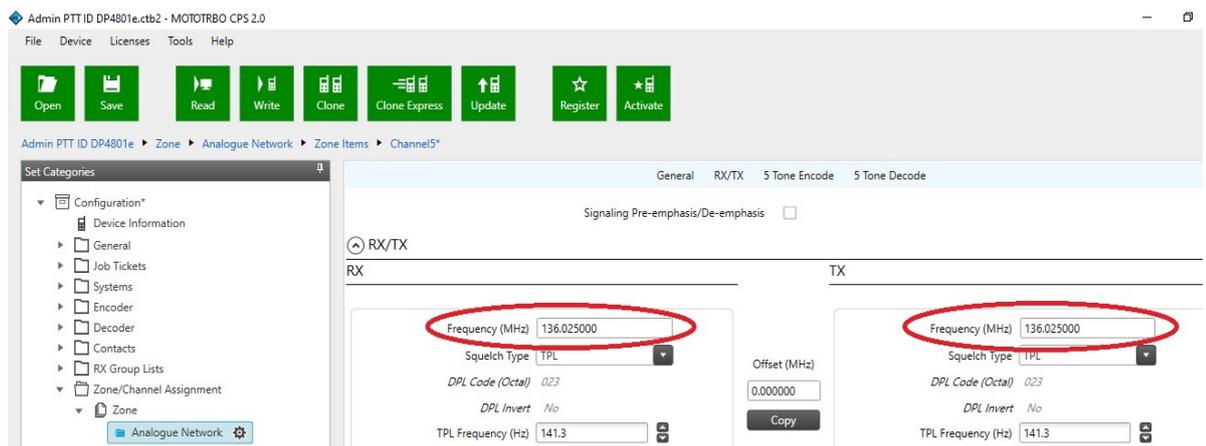| ⚠	Do not copy/paste the channels from one codeplug into another. Edit the below details individually when adding frequencies. The reason for this is that there can easily be mistakes when copy/pasting settings.

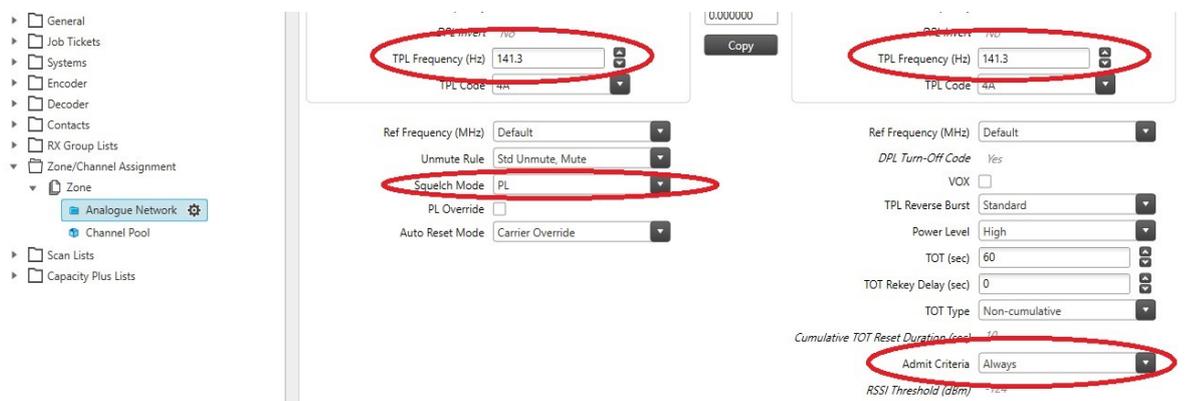o   Double click the **newly created channel**

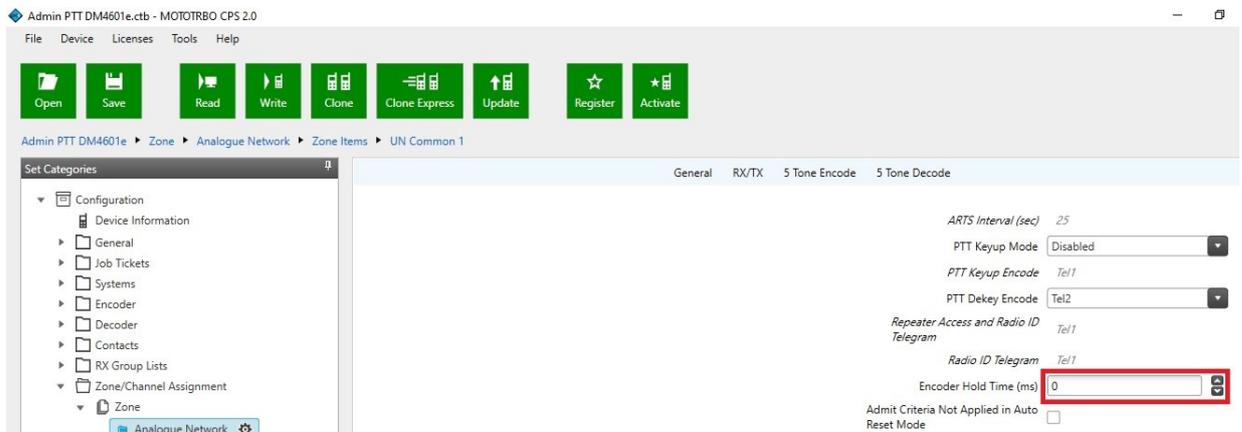o   Add **Channel name** and **Channel Bandwidth** (12.5 kHz is the standard)

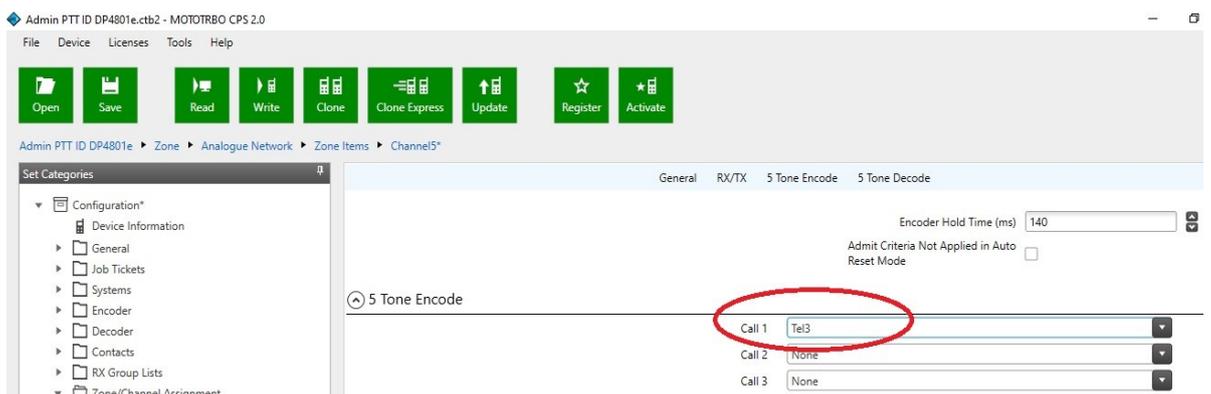o   Update the **TX and RX Frequencies**

o   Choose **PL** as **Squelch Type**

o   Choose **TPL code 4A, 141,3 Hz** (UN standard)

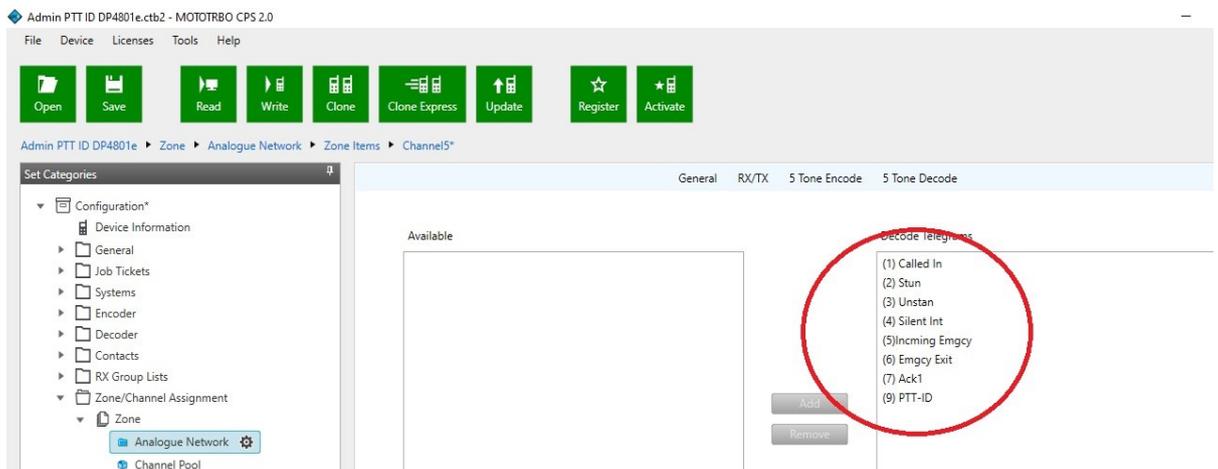o   Choose **Admit Criteria** should be set as **Always.**
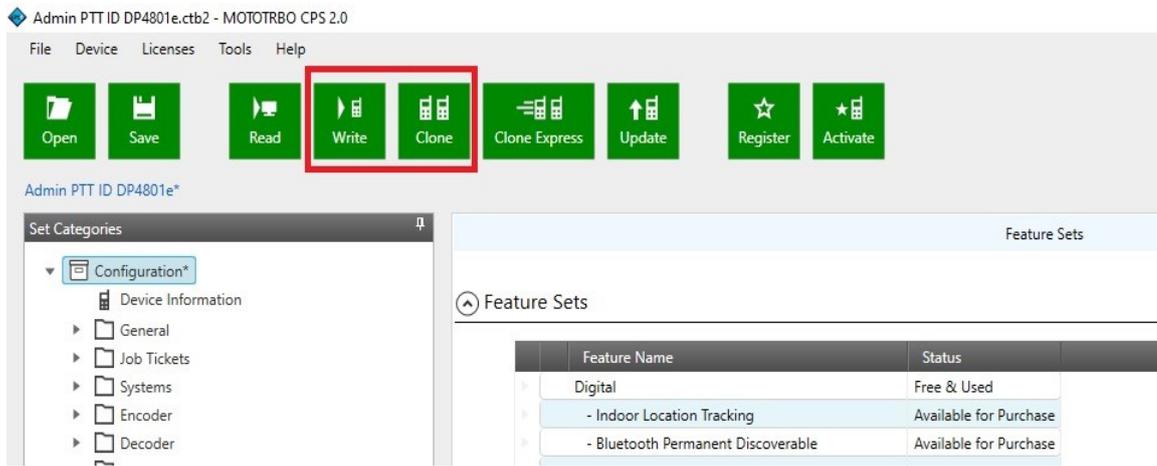
- o Change **Encoder Hold Time** to 0:

- o Choose **Tel3** as **Call 1** in the **5-Tone Encode** settings:

- o Add the **SelV** functions to the **Decode Telegrams**:

- o **Write** alt. **Clone** radio.

Annex A – Troubleshooting

Trouble Reading / Writing / Cloning a radio

When connected to a radio via the USB cable, ensure that a network connection is properly created to the radio, and you have been assigned an IP address.

If you are unable to connect the radio to the CPS via USB cable, follow the procedure given below:

o   Disable firewall.

o   Change the firewall settings to let the Mototrbo CPS through.

o   Disconnect from all other networks/internet.

o   Turn the radio OFF and then back ON.

o   Try another USB port.

o   Check that you are using the correct USB cable, double check the part number with the list.

If you still cannot connect to the radio to the CPS via the USB cable, try connecting via the Bluetooth.

Code Plug Versions in Archive and Device Do Not Match

If the codeplug version in the radio does not match with the standard codeplug, you will see the following error message. It is safe to ignore this message and proceed with writing/cloning your codeplug to the device.
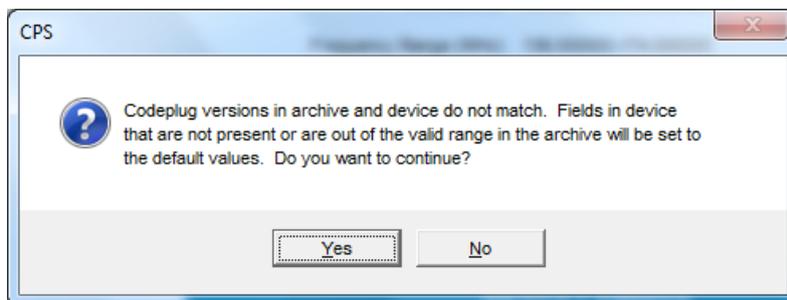
Annex B – Connecting to the radio via Bluetooth

Depending on your computer the process of connecting the radio will be slightly different.

o   On DP4801 or DM4601, press the **OK** Button to open the Main Menu.

Select **Bluetooth ▸ My Status**.

Change the Bluetooth status to **On**.

A Bluetooth symbol appears on the main screen.

Press the **OK** Button on the Main Menu.

Select **Bluetooth ▸ My Name.**

> The default name is Motorola, you can leave the name as it is, or change it to include your name or call sign, for example, Motorola – JF9.8.1.

Press the **OK** Button again, and then select **Bluetooth ▸ Find Me** to enable the Bluetooth and to make the radio discoverable.

To connect the radio to your computer, search for the Bluetooth Devices, and select the radio name assigned in Step 0.
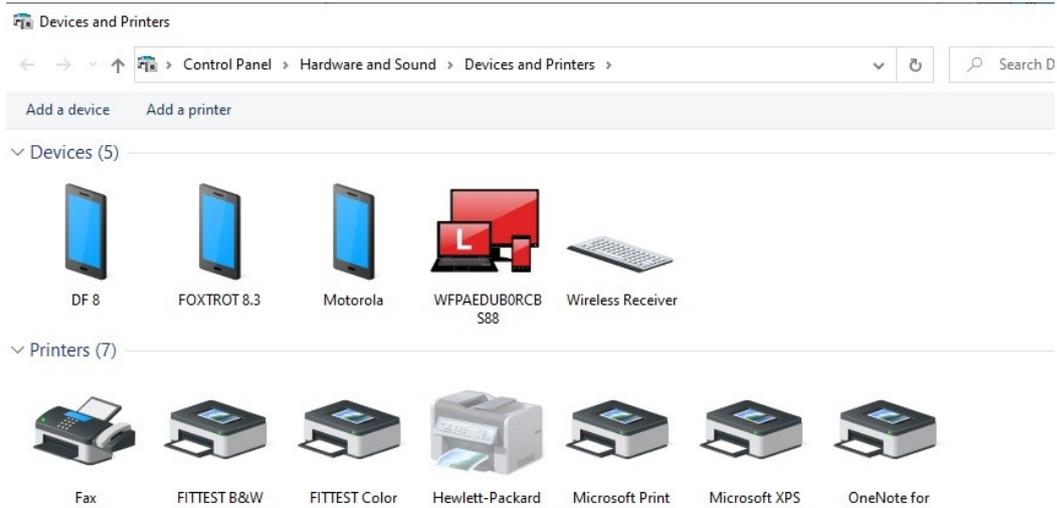
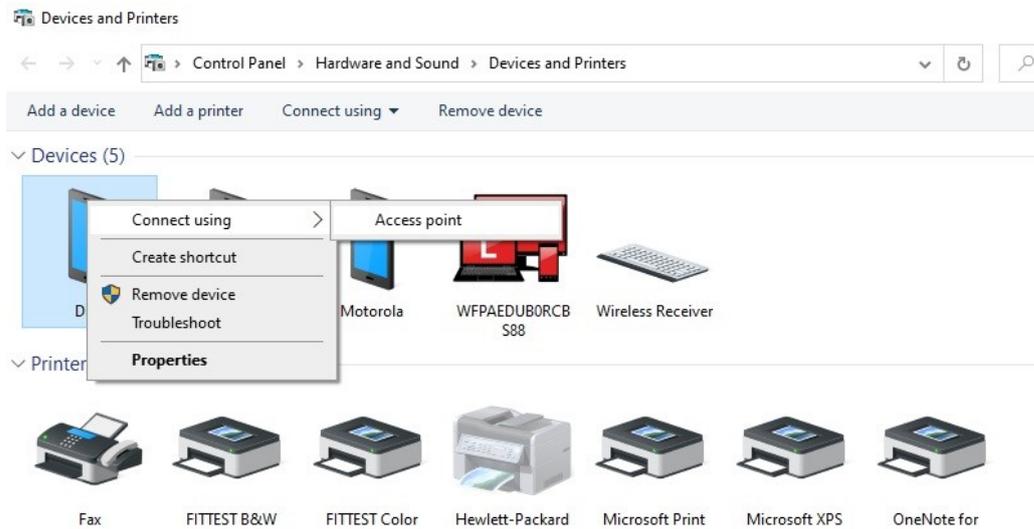Click **Next** to add the radio to the computer.
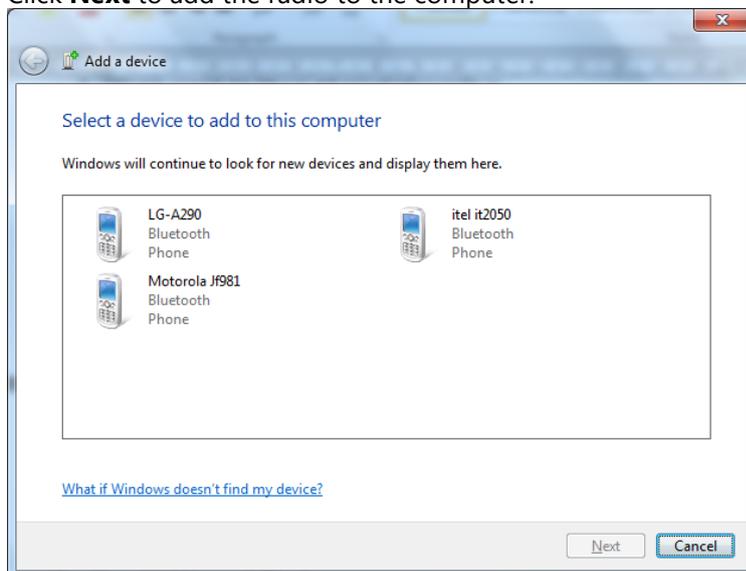
On the radio and the computer, select **Accept** to pair the radio's Bluetooth with the computer's Bluetooth.

> Upon accepting the connection requests on the radio and computer, the computer installs device drivers. Once the Bluetooth enabled radio has been added to the computer, you need to connect to the radio.

On the computer, navigate to **Devices and printers.**

Right click on the added Bluetooth device and choose **Connect using access point.**

Once the radio is connected to the computer, the radio displays the Bluetooth symbol with a dot next to it, as illustrated below:

Open the CPS and click on the **Bluetooth** symbol on the top of the screen.

The standard IP address of the radio in Bluetooth mode is **192.168.11.1**. Do not change the IP address. The computer is now connected via Bluetooth to the radio and can read, write and clone in the same way as you would with a USB cable.
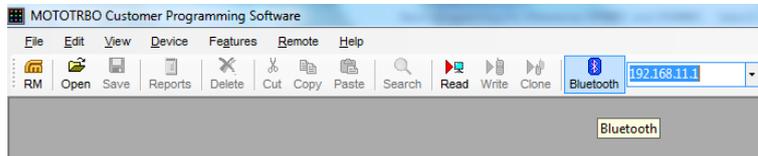
Annex C – Quick programming instructions

If you want quickly to program a radio with just changing the SelV ID read the "**Programming Manual Quick manual changing callsign and SelV Motorola**" document or do the following:

1- Open the CPS 16 or CPS 2.0 depends on the firmware of your radio equipment.

2- Open the standard code-plug for the intended radio and choose between User or Network Admin depends on the useage in the SOC or in the field.

3- Change the radio call sign and radio ID from:

> A- General setting \ Radio name

> B- General setting \ 5-tone radio ID

4- Go to channels and change the following:

> A- Channel name to appropriate name based on standard channel plan in the country

> B- Channel frequency of Tx/Rx as per the frequency plan licensed in the country

> C- TPL to approriate one as per the frequency plan licensed in the country

5- Clone the radio