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Application Notes

OTAP for TAIT DMR TIER III Trunking System

NX-5000 Series R4.6

NX-3000 Series R3.6

KPG-D1 R4.6

KPG-D3 R3.6

KPG-180AP R4.1

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Contents

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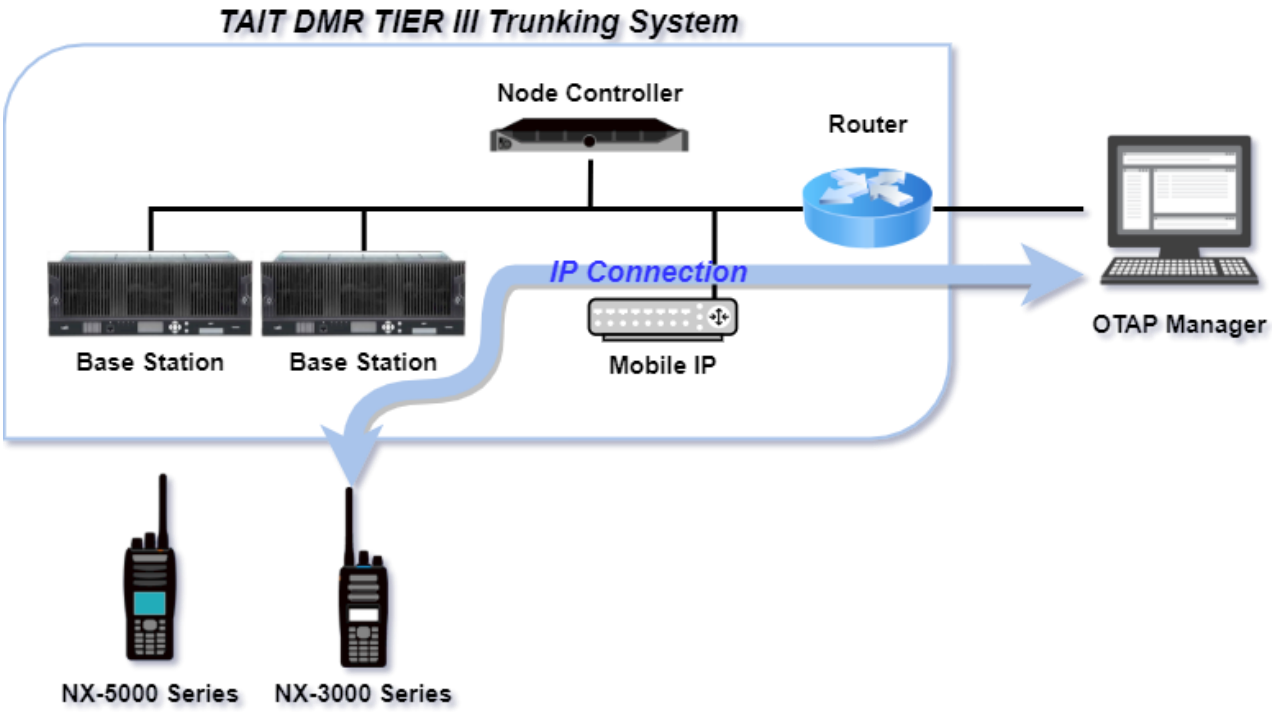
1. Overview

1.1. Outline Features

With this version up scheduled in June 2022, OTAP (Over the Air Programming) will be supported on TAIT DMR TIER III Trunking System. The figure below is an overview of devices and their operations relating to this update.



The devices constructing the TAIT DMR TIER III System and KPG-180AP OTAP Manager are connected to the IP network for communication. Further, the TAIT DMR TIER III Trunking System supports "DLL derived IP addressing" which is specified in ETSI 102 361-3. And a Radio uses ID and IP address which correspond to each other in the TIER III Trunking System. That is to say, when a Unit ID value is determined, the IP address of the Radio is also determined. With this Update, the NX-5000 series and the NX-3000 series will be able to support a part of the DLL derived IP Addressing, therefore, the IP address is set to the Radio based on the Unit ID, and communication with the OTAP Manager using the IP network will be capable on the TAIT DMR TIER III Trunking System.

DLL derived IP addressing

	0	Network ID (Class A)							Host Address / Host Number																			
Bit	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0
IP Address		**10.**							**0.**								**3.**								**232**						
Unit ID									**1000**																						

Unit ID Number = 1000
IP Address = 10.0.3.232

1.2. Product Versions

Please use the supported versions of Firmware and Software to run the OTAP on the TAIT DMR TIER III System.

Product	Supported Version
NX-5000 series	**V4.60 or later**
NX-3000 series	**V3.60 or later**
KPG-D1/D1N	**V4.60 or later**
KPG-D3/D3N	**V3.60 or later**
KPG-180AP	**V4.10 or later**

1.3. Software License

To execute the OTAP on the TAIT DMR TIER III Trunking System by using KPG-180AP, you will need to purchase the below license and will then need to apply the license by using KPT-300LMC.

Model Name	License Key	Description
KPG-180AP	KWD-AP5-DP	DMR IP OTAP

2. Basic Configuration for OTAP: TAIT DMR TIER III Trunking System

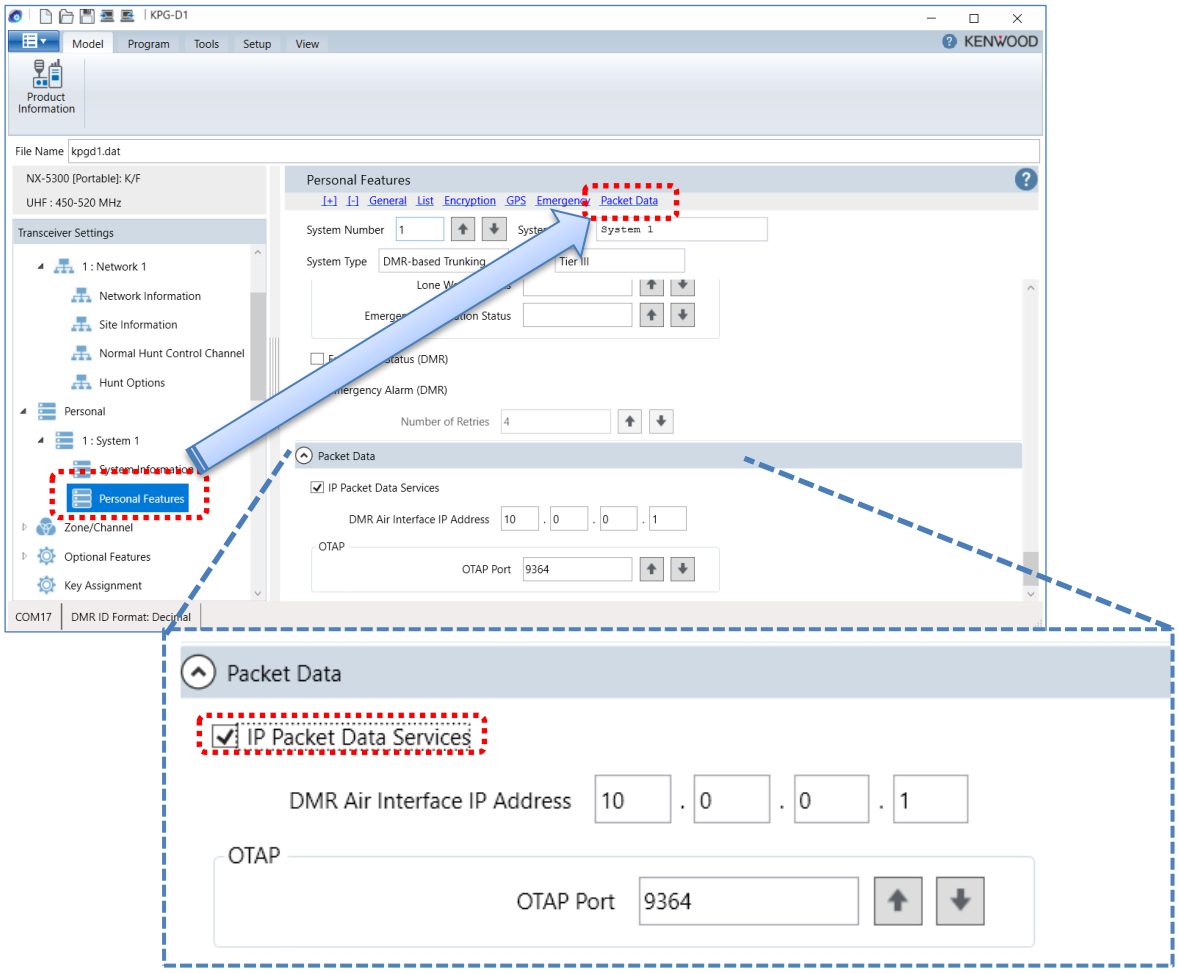
This chapter introduces the basic settings for the Radio, and the KPG-180AP OTAP Manager to implement the OTAP System on the TAIT DMR TIER III Trunking System.

2.1. KPG-D1/D1N

2.1.1. Transceiver Settings > Personal Features > Packet Data

Please set the IP address of the Radio and the IP communication will be available on the TAIT DMR TIER III Trunking System. With this update, you can set this up on the KPG-D1/D1N.

2.1.1.1. IP Packet Data Services

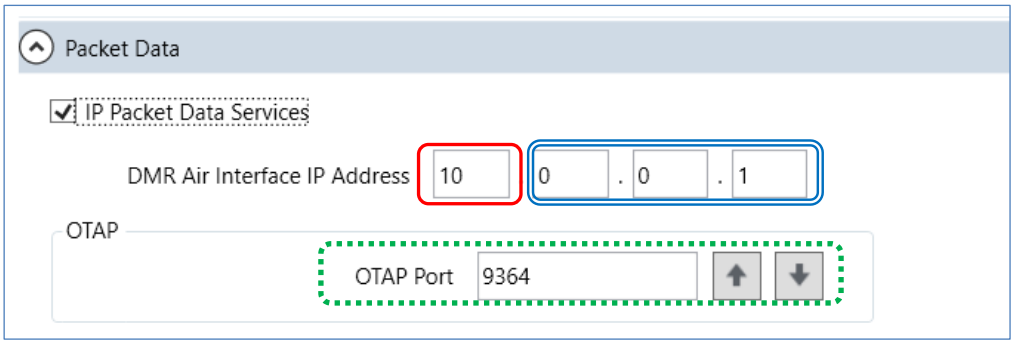


Please tick an "IP Packet Data Services" checkbox to activate the IP address. When this checkbox is ticked, a network address of 10.0.0.0 is assigned as a default, and an IP address that is converted from the UID number set in the Radio is assigned in a Host

portion as a default.

2.1.1.2. DMR Air Interface IP Address

When an "IP Data Packet Services" check box is ticked, "10" is input in the first octet of the DMR Air Interface IP address as a default (indicated in a solid line in the figure: Network ID portion). Octet values which are calculated by dividing 24 bits of UID number by 8 bits are in the second to fourth octets which are the Host portion (indicated in a double line in the figure: Host portion). The IP address assigned in the figure below is a default IP address which is set when the UID number of the radio is "1".
Once the UID number is determined, the three octet values of the Host portion are automatically input, and you cannot edit these values. You can change the first octet of the Network ID portion, but it must be the same as the Network ID set in the Fleet of the Node Controller of the TAIT DMR TIER III Trunking System. Also, in the Fleet set by the Node Controller of the TAIT DMR Trunking System, the fist and the last values of the IP address must be set to include the IP address which is set in this step (Please refer to the Appendix).



2.1.1.3. OTAP Port

Please input a UDP port number used when the Radio communicates with the OTAP Manager. The default value is "9364" (indicated in a dashed line in the above figure). It is NOT recommended to change this default value as it must be the same as the default value of the UDP port of the OTAP Manager.

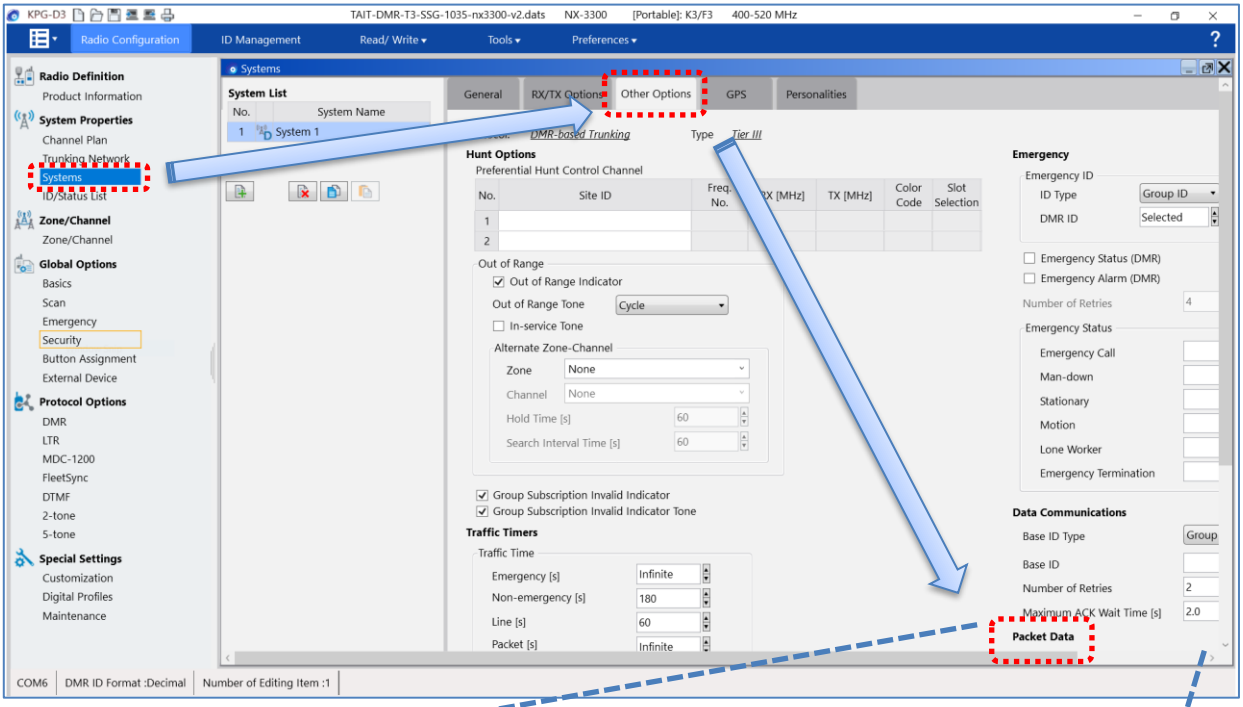
2.2. KPG-D3/D3N

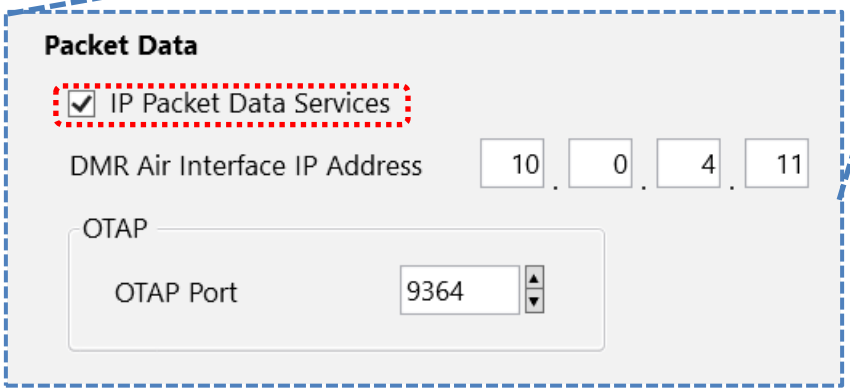
2.2.1. System Properties >Systems >Other Options > Packet Data

With this update, you can set the IP Packet Data Service on the KPG-D3/D3N as is the same as KPG-D1/ D1N.

2.2.1.1. IP Packet Data Services

Please activate the IP address by ticking the "IP Packet Data Services" checkbox. When this checkbox is ticked, a default network address of 10.0.0.0 is assigned, and an IP address converted from the UID number set in the Radio is assigned in the Host portion as a default.

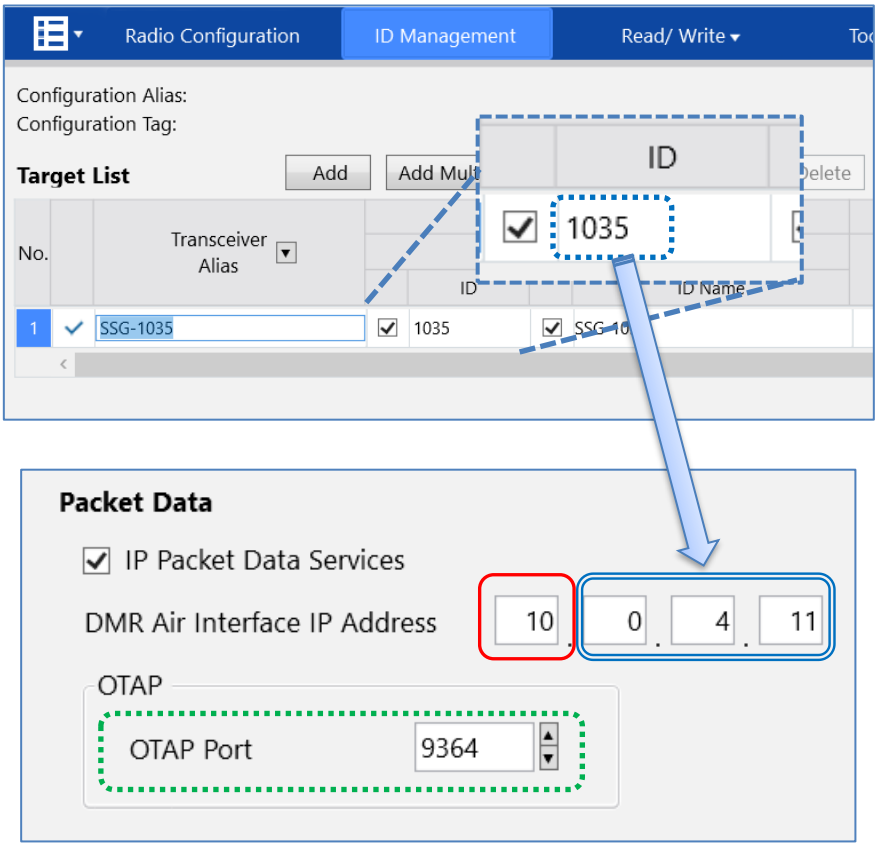




2.2.1.2. DMR Air Interface IP Address

When an "IP Data Packet Services" check box is ticked, "10" is input in the first octet of the DMR Air Interface IP address as a default (indicated in a solid line in the figure: Network ID portion). Octet values which are calculated by dividing 24 bits of UDI number by 8 bits are in the second to fourth octets which are the Host portion (indicated in a double line in the figure: Host portion). The IP address assigned in the below figure is a default IP address which is set when the UID number of the Radio is "1035".

Once the UID number is determined, the three octet values of the Host portion are automatically input, and you cannot edit these values. You can change the first octet of the Network ID portion, but it must be the same as the Network ID set in the Fleet of the Node Controller of the TAIT DMR TIER III Trunking System. Also, in the Fleet set by the Node Controller of the TAIT DMR Trunking System, the fist and the last values of the IP address must be set to include the IP address which is set in this step (Please refer to the Appendix).



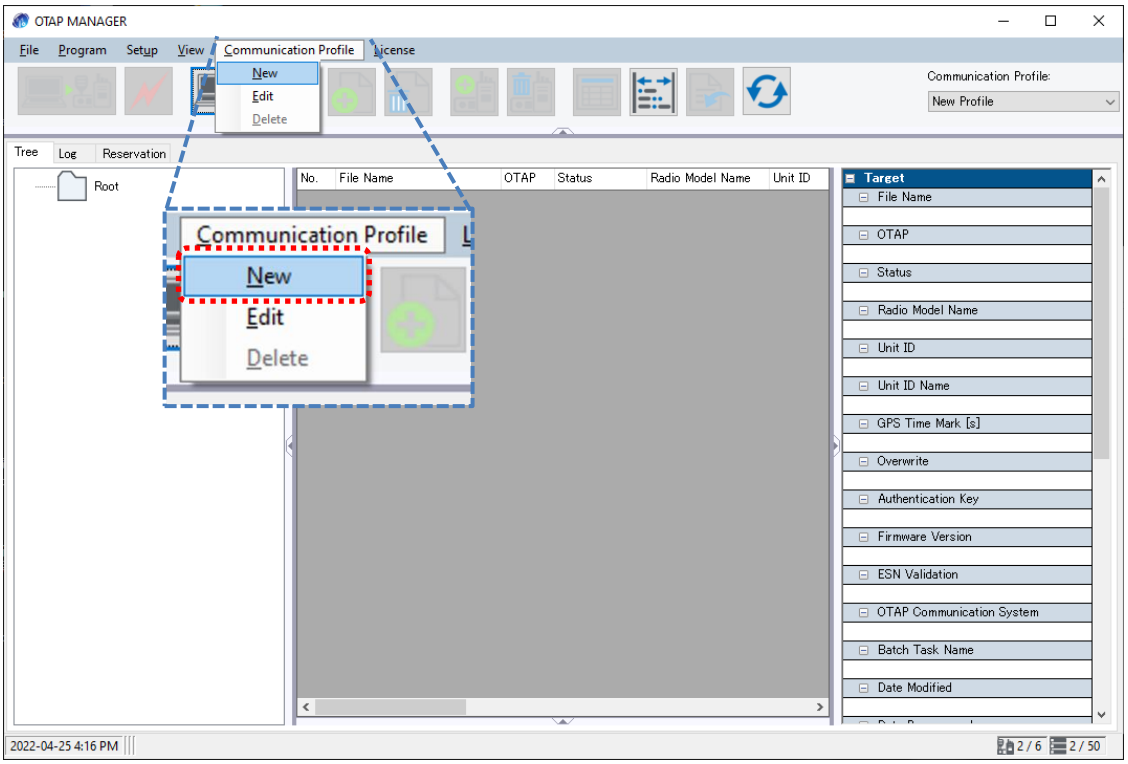
2.2.1.3. OTAP Port

Please input a UDP port number which is used when the Radio communicates with the OTAP Manager. The default value is "9364" (indicated in a dashed line in the above figure). It is NOT recommended to change this default value as it must be the same as the default value of the UDP port of the OTAP Manager.

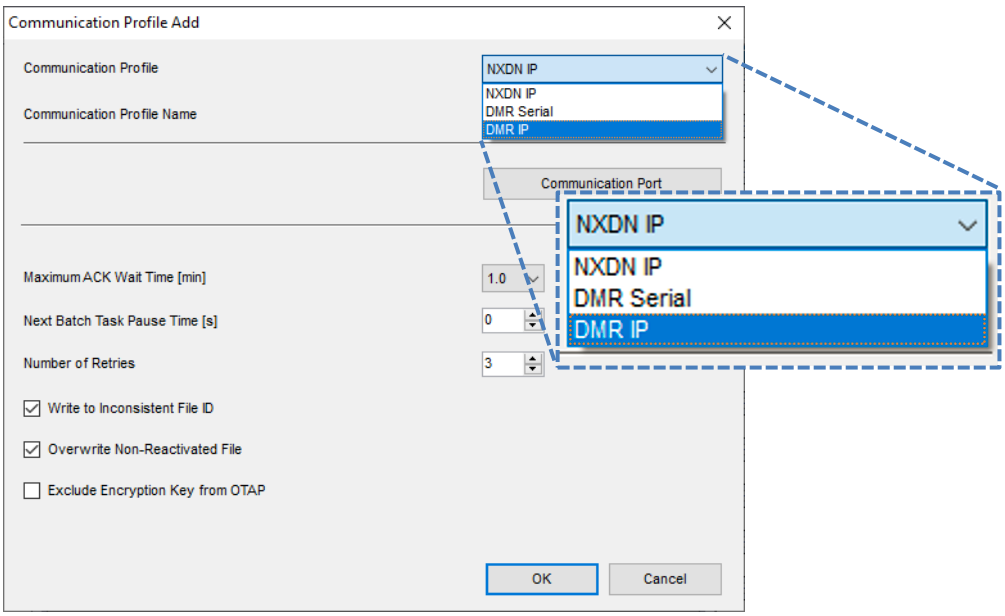
2.3. KPG-180AP OTAP Manager

2.3.1. Communication Profile

At first, start the KPG-180AP OTAP Manager and create a new "Communication Profile" by selecting "Communication Profile> New" as shown in the figure below to open the "Communication Profile Add to screen".

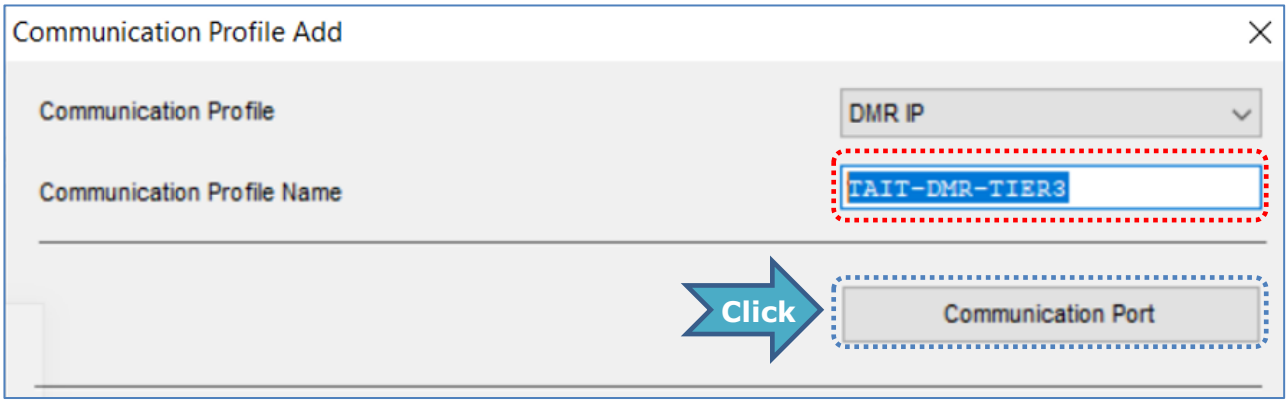


Select "DMR IP" from the "Communication Profile" menu.



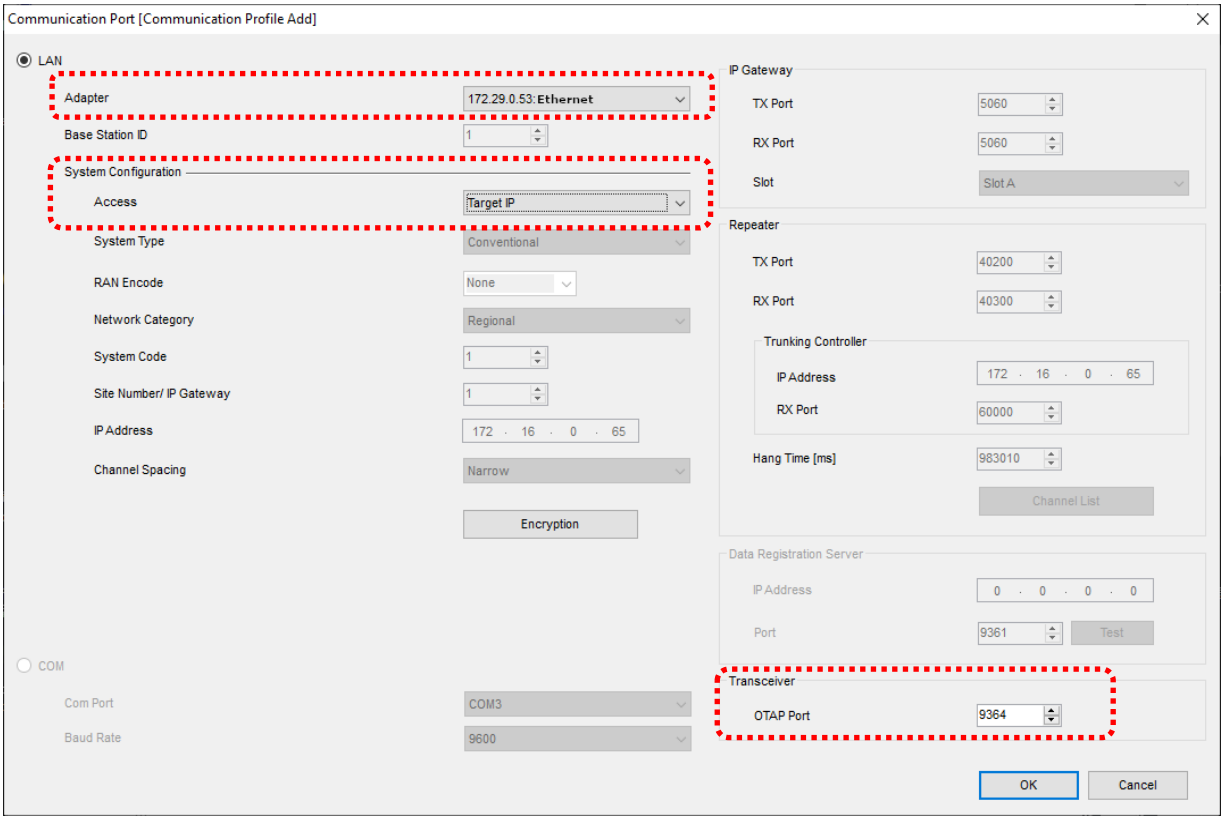
2.3.2. Communication Profile Name

Any text can be entered in “Communication Profile Name”. After entering, click the "Communication Port" button.



2.3.3. Communication Port

The screen below will be displayed when the “communication port” button is clicked. You will be able to set a network interface adopter of the OTAP Manager PC which is connected to the TAIT DMR TIER III Trunking System and set necessary items to allow the communication between the OTAP Manager and the Radio.

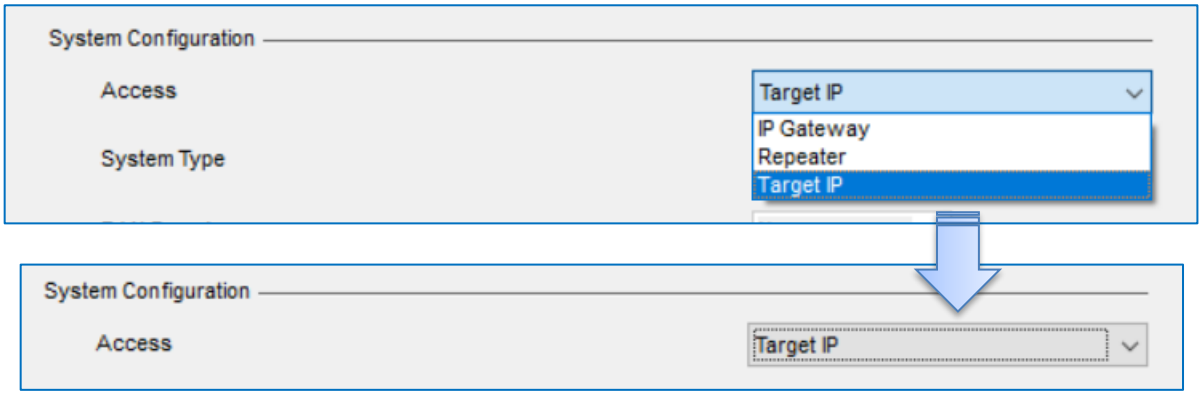


2.3.3.1. Adapter

Please select a network interface that will be used when the OTAP Manager communicates with the TAIT DMR TIER III Trunking System.

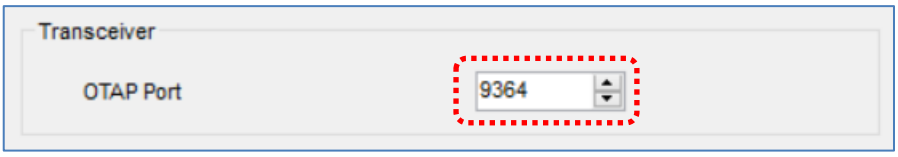
2.3.3.2. System Configuration>Access

The TAIT DMR TIER III Trunking System supports the DLL derived IP addressing, and with this Update, the IP address has been assigned to the Programming data of the Radio which is to be registered in the OTAP Manager, beforehand. Accordingly, a destination of the access of the OTAP Manager is an IP address of a Target. Therefore, please select "Target IP".



2.3.3.3. Transceiver> OTAP Port

A UDP port number that is used by the Radio is input in "Transciever>OTAP Port". This value needs to be the same as the UDP port number set in a [OTAP Port] menu of KPG-D1/D1N and KPG-D3/D3N. The default port is "9364" which is the same as the default values of KPG-D1/D1N and KPG-D3/D3N. It is recommended to use the default UDP port number in the Radio and the KPG-180A OTAP Manager.

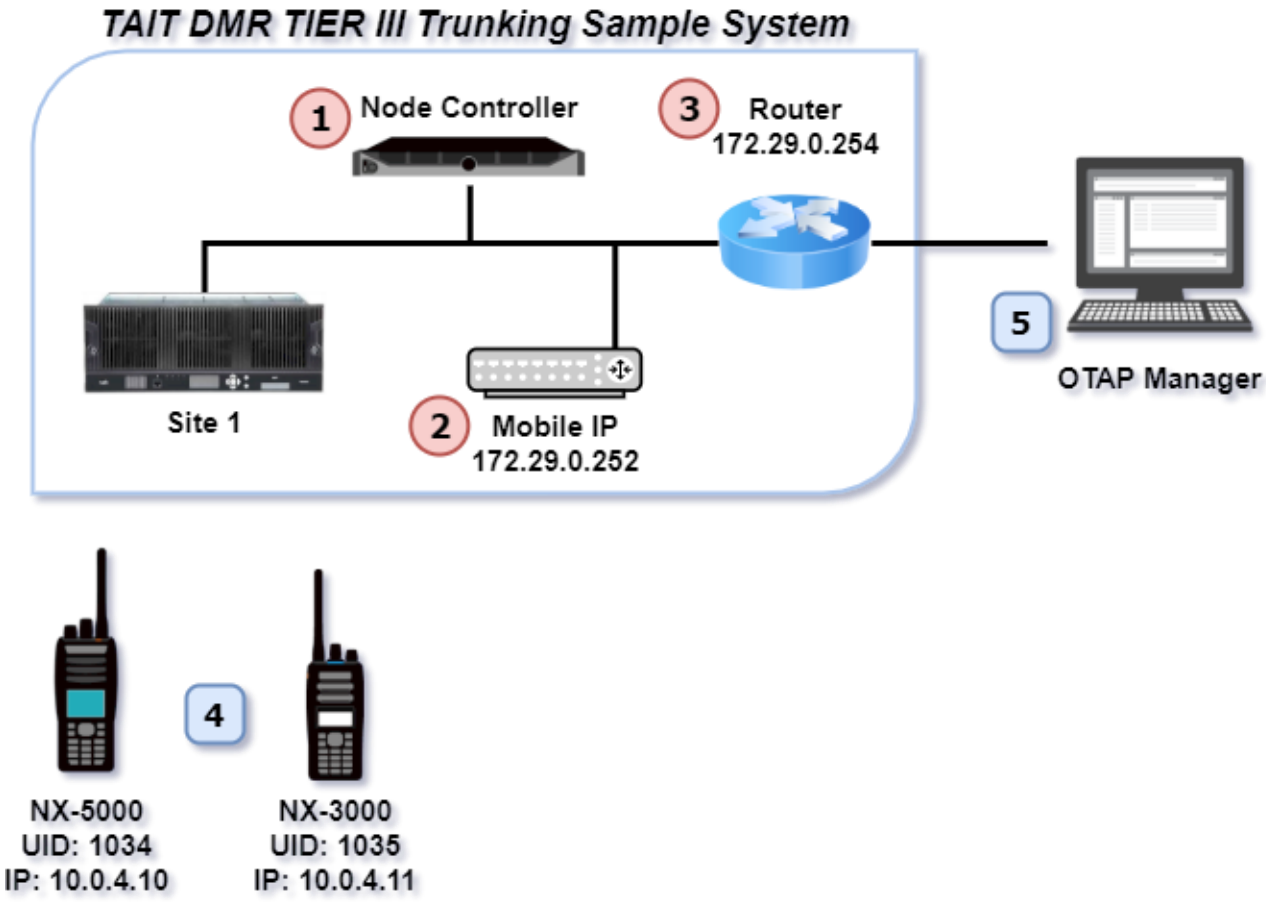


3. Appendix

This Appendix uses simple sample cases to give you tips for setting up the NX-5000 Series, the NX-3000 Series, and the TAIT System so that you will be able to run and use the OTAP Manager on the TAIT TIER III System.

3.1. Sample System

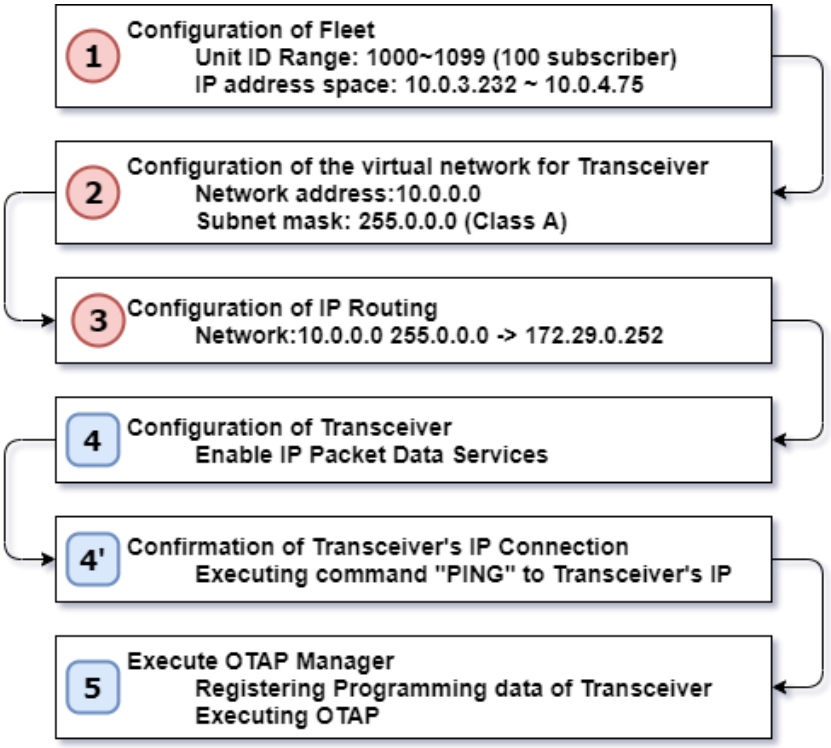
You will be able to learn a tip for configuring the Sample System, an approximate setting flow, and cautions in this chapter.



In the above figure, the numbers 1 to 5 are assigned to parts that are largely related to the system operation. Let's look at the figure in the numbered order and you will run the OTAP on the TAIT System. The configuration of the devices with numbers 1 to 3 in a circle needs to be set by an administrator of the TAIT System. Therefore, this Appendix shows items to be set by the administrator. The numbers 4 and 5 in a square are to explain how to confirm what is added in this Update easily and necessary preparation.

3.2. Flow of Configuration for Sample System

Please see the below flowchart in connection with the settings necessary for operating the OTAP Manager on the Sample System.



3.2.1. Configuration of Fleet

First of all, please ask the administrator of the TAIT DMR TIER III Trunking System to set the Fleet on the Node Controller. Please see the below setting example of the Fleet including the Unit ID of the Radio used on this Sample System.

Item	First	Last
Subscriber ID	1000	1099
IP Address	10.0.3.232	10.0.4.75

In the actual system, the administrator of the TAIT DMR TIER III Trunking System will be required to set an ID range and IP address range for the Fleet. By setting these Fleet settings on the Node Controller, the Radio obtains the IP address for connecting to the IP network, and the Unit ID and the IP address used on the TAIT DMR TIER III Trunking are uniquely determined.

3.2.2. Configuration of the virtual network for Radio

In this Sample System, it is recommended to use the below-stated network segments as the IP address range, that is say a subnet, that is used by the Radio.

Network Segment for Radio	
Network Address	10.0.0.0
Subnet mask	255.0.0.0

In the TAIT DMR TIER III Trunking System, a virtual network for the Radio is defined in the "Mobile IP" Network Unit which is in the Sample System configuration. In this Sample System, the "Mobile IP" Network Unit is configured so that the network address of "10.0.0.0" and the Subnet Mask of "255.0.0.0" (Class A) are assigned as the virtual network segment. This configuration will be set by the administrator of the TAIT System or the Network engineer. Accordingly, please ask the system administrator to add or change the settings when applying this to your system . With this configuration, the Virtual Network Segment to which the Radio is connected will be determined.

3.2.3. Configuration of IP routing

A Router in the Sample TAIT DMR TIER III System configuration locates at an external network boundary and transfers the IP data from the other networks to the System. In the previous step, the network segment of the Radio was configured as "10.0.0.0/8". In this network device, IP routing is configured to transfer the IP data, which is sent to the configured Virtual Network Segment (10.0.0.0/8), to the "Mobile IP" Network Unit. In other words, the IP data, which is sent to the IP set in the Radio, is transferred to the "Mobile IP" Network Unit. In this Sample System, the IP data is transferred to the below-listed IP addresses.

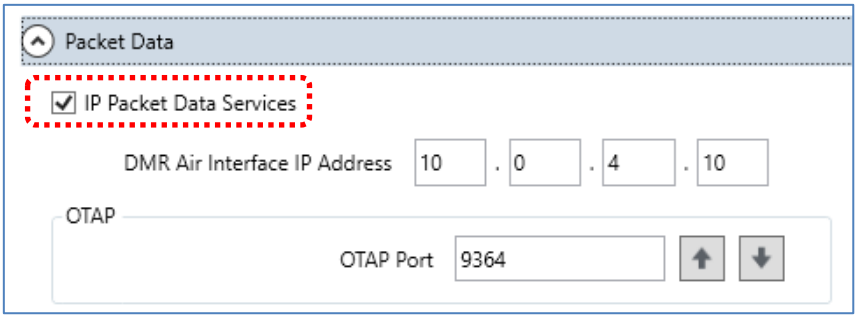
IP Routing for Radio	
Next Hop IP Address	172.29.0.252
Network Address	10.0.0.0/8

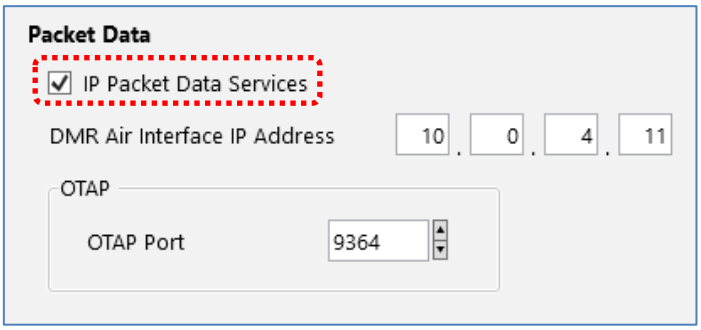
Please contact the system administrator to add or change the setting of the Router when applying this configuration to your system. This setting will allow the IP communication between the OTAP Manager PC and the Radio.

3.2.4. Enable IP Packet Data Services

The administrator of the TAIT System and the Network administrator are responsible for the configurations explained in the previous three Chapters. Upon completion of the three configurations, IP communication between the PC installing the OTAP Manager and the Radio will be possible. In this Chapter, the below-stated configurations will be written to the Radio which is connectable to the DMR TIER III Truncking by referring to the Chapters 2.1 KPG-D1/D1N, Chapter 2.2 KPG-D3/D3N.

Radio Type	Unit ID	DMR Air Interface IP Address	OTAP Port
NX-5000 series	1034	10.0.4.10	9364
NX-3000 series	1035	10.0.4.11	9364



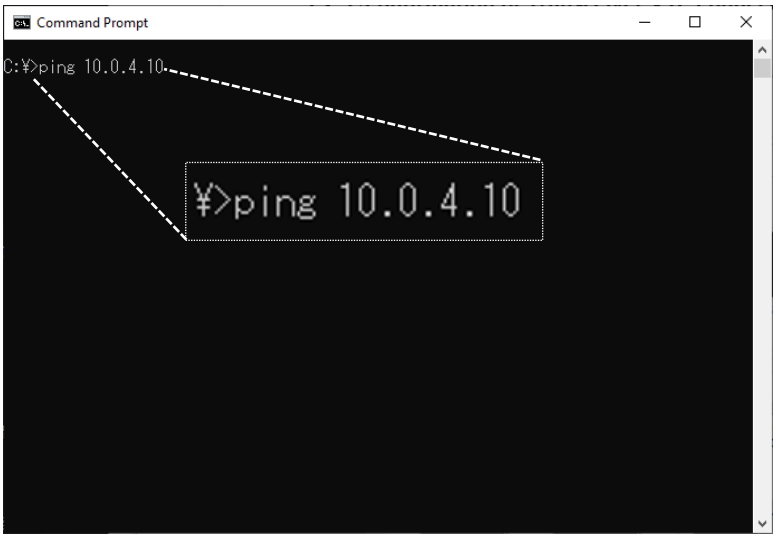


When an IP Packet Data Services checkbox is ticked, the IP address is automatically assigned from the Unit ID. The Unit IDs of the two Radios used in this Sample System have been set in advance. Therefore, all you have to do is to tick the IP Packet Data Services checkbox. Please write data to the Radios and reboot. The Radios will be registered to the system and will be capable of using not only the Trunking systems but also the IP communication. Further, by registering the configured programming data of the Radios to the OTAP Manager, the OTAP function will be operable.

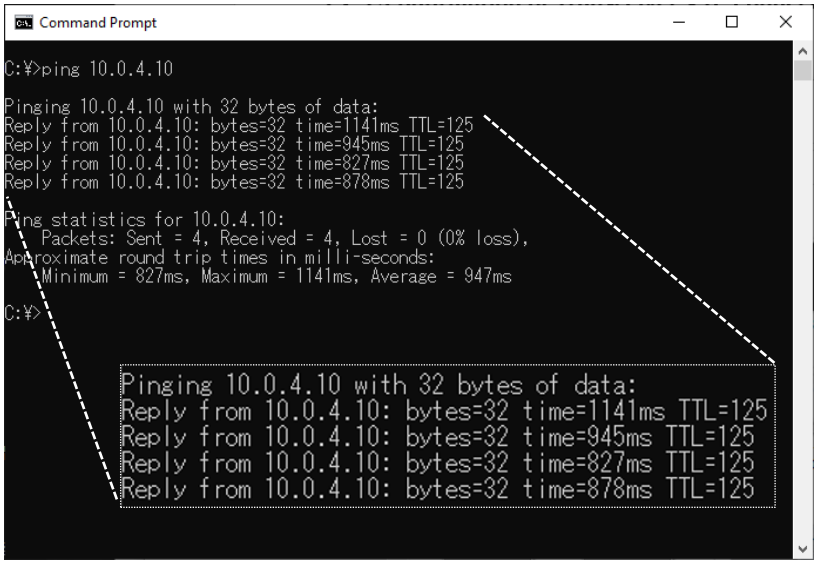
3.2.5. Confirmation of Radio's IP Connection

In the previous chapter, we have completed the setup of the Radios. The Radios to which the programming data have been written and rebooted are supposed to be ready for the IP

communication.　However, there may be a case where the Radio has no connection to it. Accordingly, we will introduce a method for checking whether the rebooted Radio is IP communicable with the OTAP PC by using the Radio set in the Sample System as an example.
Please see the Command Console below.　Please use the “ping” command for continuity check of the IP communication.



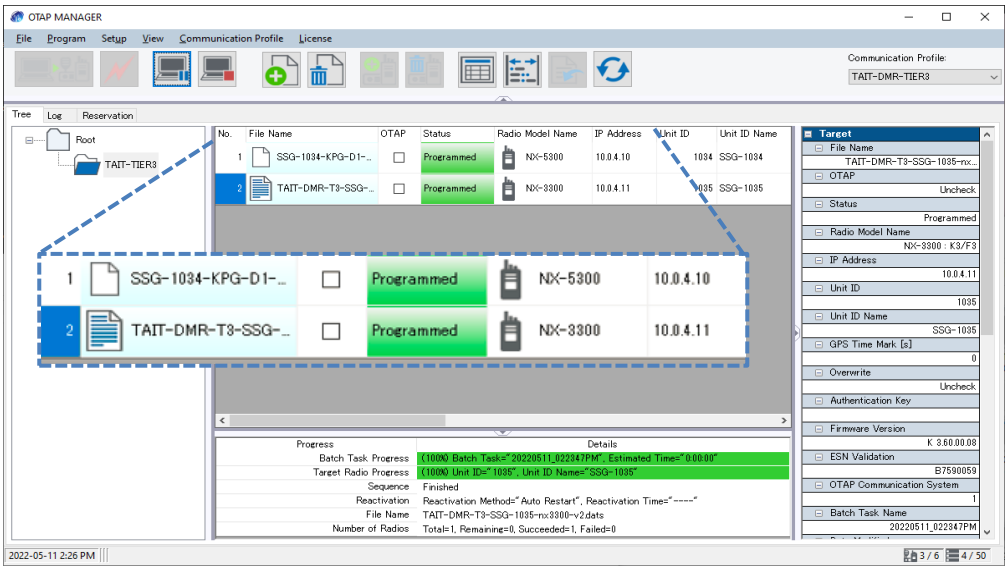
Please start a command prompt on the PC with the OTAP Manager, input “10.0.4.10” and then push the Enter key. (Please note the IP here is set for the NX-5000.)



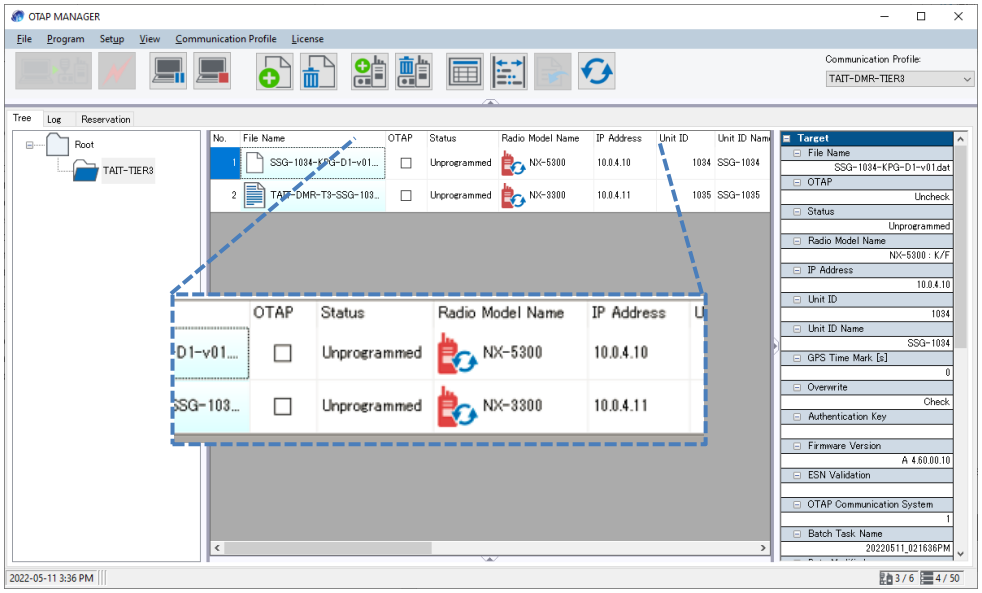
If the above response is returned, you will be able to establish communication with the OTAP without any problem.　However, if the response is not returned, you lose the IP connection from time to time, and so on, please ask the network administrator for help.

3.2.6. Execute OTAP Manager

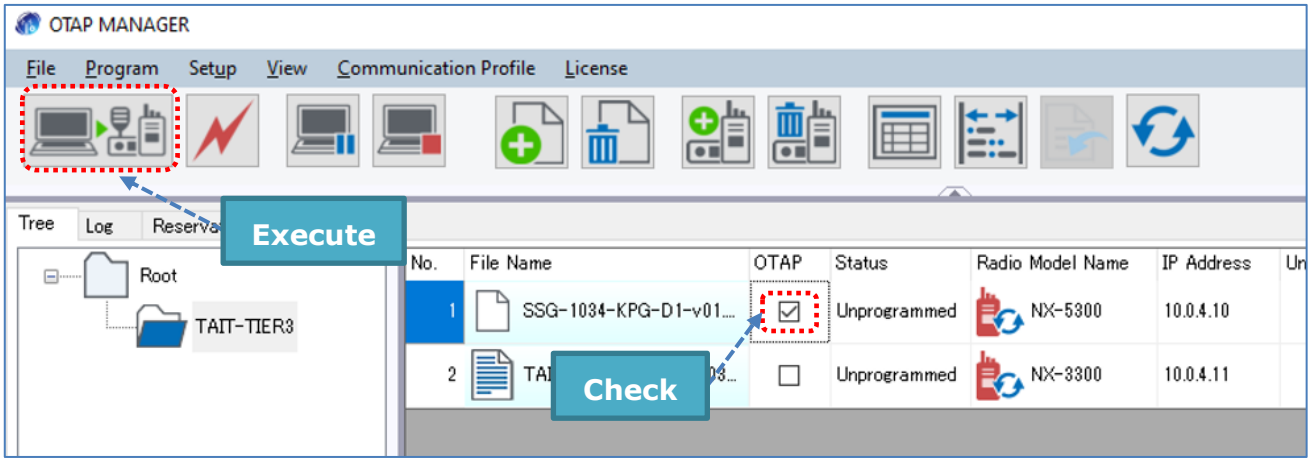
If you have confirmed that the Radio is IP communicable without any problem in the previous chapter, the OTAP Manager will be operated normally. Therefore, you can register the programming data of the Radio whose IP address has already been configured in the OTAP Manager. The data will be registered in the same manner as the previous version. When the data is successfully registered and the status of the programming data of the Radio and that of the OTAP Manager are the same, the screen below will be displayed.



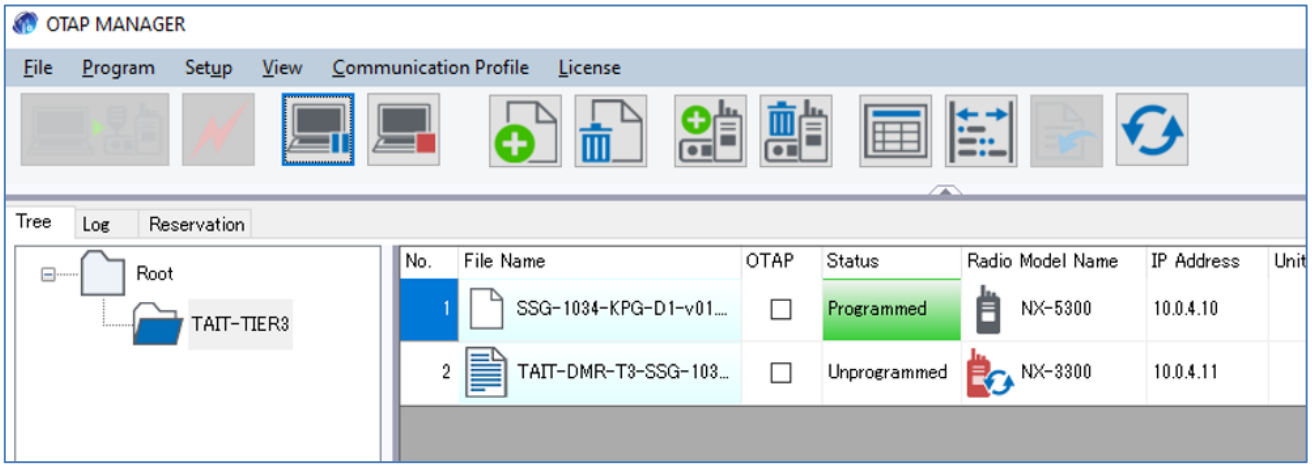
This screen will appear when the programming data is edited as needed.



Please tick a checkbox next to the Radio you wish to update, then press the Execute button to start operating the OTAP.



When the data communication of the OTAP is terminated, the screen below will be shown.
And the programming data is successfully written to the ticked Radio.



Now, you have successfully confirmed that the OTAP Manager operates normally. When operating the OTAP Manager on your system, it is recommended to refer to the Appendix in this document and work in cooperation with the administrator of the TAIT System or the network system administrator.

Revision History

Version	Date of issue	Note
1.00	27 May 2022	First Release