TETRA Signal Generator

Introduction

The Anritsu TETRA Signal Generator provides you with a PC utility to quickly create a T1 TCH/7.2 test signal for Base Station sensitivity testing as per the TETRA test specification to be used with the Anritsu LMR Master S412E handheld instrument. To begin using the utility, install the software, enter your signal pattern parameters into the dialogs, and then save the generated signal pattern file for importing into your LMR Master.

This document also provides the necessary instructions on how to generate custom TETRA DL patterns, and to load these new patterns into LMR Master S412E. This feature is to be released in November, 2021. Refer to "Installing the TETRA DL Signal Generator Software".

Required Hardware and Software

- LMR Master S412E with TETRA Analyzer (Option 581) upgraded to firmware 4.40
- Windows 10 computer
- USB Memory Device formatted using FAT32 file system
- Internet Connection

Installing the TETRA Signal Generator Software

- 1. Install the software by running "TETRASignalGenerator.exe"
- 2. Click "Yes" if prompted to allow unknown publisher to make changes to this computer.
- 3. When the installation screen comes up, click [Next] to continue.



Figure Front-1.TETRA Signal Generator Installer



4. Check "Add a shortcut to the desktop" if desired and click [Next] to continue.

Choose installation folder:	
C:\Program Files\Anritsu\TetraSignalGenerator	B <u>r</u> owse
	Restore Default Folder
Add a shortcut to the desktop	

Figure Front-2.Installation Options

- **5.** If MATLAB Runtime is not installed on your machine, the installation program will prompt you to install it.
 - **a.** Choose the installation folder and click [NEXT] to continue.

MATLAB Runtime is required.	
Choose installation folder:	MATLAB [*]
C:\Program Files\MATLAB\MATLAB Runtime Browse	RUNTIME R2016a
Kestore <u>P</u> erault Folder	
MATLAB and Simulink are registered trademarks of The MathWorks, Inc. Please see mathworks.com/trademarks for a list of additional trademarks. Other product or brand names ma be trademarks or registered trademarks of their respective holders.	y
WARNING: This program is protected by copyright law and international treaties. Copyright 1984-2016, The MathWorks, Inc. Protected by U.S. and other patents. See MathWorks.com/patent	5
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Figure Front-3. Required Software

b. Accept the MathWorks, Inc. Software license and click [Next] to continue.



Figure Front-4.License Agreement

- 6. If the MATLAB Runtime is already installed, click [Next] to continue.
- 7. The confirmation screen will appear. Press [Install] to install the MATLAB runtime software.



Figure Front-5. Confirmation Window

8. When installation is complete, click [Finish] to continue.



Figure Front-6.Installation Complete Window

Installation is now complete and the TETRA Signal Generator is now ready to run.

Running the TETRA Signal Generator

- 1. If you have added a shortcut to your desktop, you can double click it to run the program.
 - The TETRA Signal Generator can also be found under the Windows Home/All Programs menu under TetraSignalGenerator.



2. Enter the desired values for Base Color Code (BCC), Mobile Network Code (MNC), Mobile Country Code (MCC), and Number of Multi-Frames, and then click [Generate Signal] button to generate your desired signal.

Note Do Not leave any field empty. Each field must contain an integer value within the specified range.

Anritsu Tetra Signal Generator	
Base Color Code (CC 0-63) 33	
Mobile NC (Network Code 0 - 16383) 8193	
Mobile CC (Country Code 0 - 1023) 513	
No of Multi-Frames (Multi-Frames 1 - 60)	
Generate Signal	

Figure Front-7. Anritsu TETRA Signal Generator

3. Select the Folder where you want the signal file to be placed and click [Select Folder].

Note Depending on the processor and Number of Multi-Frames selected, this process may take up to 30 minutes. **Do Not** cancel the signal generation process or the program may hang and need to be restarted.

Four files will be generated. The signal file that will be used in the S412E will be named:

TETRA_T1_TCH_7p2_{BCC}_{MCC}_{MNC}_{#MF}_.bin

Note Do Not rename the .bin file as the S412E will expect the .bin file to have a specific naming convention.

Where:

- {BCC} = Base Color Code
- {MCC} = Mobile Country Code
- {MNC} = Mobile Network Code
- {#MF} = Number of Multi-Frames

For more information on loading and testing custom base station patterns, refer to BS Sensitivity Menu section of the Land Mobile Radio Analyzer and Coverage Measurement Guide (10580-00243AE-LMR-MG).

Installing the TETRA DL Signal Generator Software

- 1. Install the software by running "TETRA DL Signal Generator.exe"
- 2. Click "Yes" if prompted to allow unknown publisher to make changes to this computer.
- 3. When the installation screen comes up, click [Next] to continue.



Figure Front-8.TETRA DL Signal Generator Installer

4. Check "Add a shortcut to the desktop" if desired and click [Next] to continue.



Figure Front-9.Installation Options

- **5.** If MATLAB Runtime is not installed on your machine, the installation program will prompt you to install it.
 - a. Choose the installation folder and click [NEXT] to continue.





b. Accept the MathWorks, Inc. Software license and click [Next] to continue.

The Mathworks, Inc.		Г
MATLAB RUNTIME LICENSE		=
IMPORTANT NOTICE		L
BY CLICKING THE "YES" BUTTON BELOW, YOU AC SO, SELECT THE "NO" BUTTON AND THE INSTALL	CEPT THE TERMS OF THIS LICENSE. IF YOU ARE NOT ATION WILL BE ABORTED.	WILLING TO DO
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Do you accept the terms of the license agreemen	nt? @ Yes 🔿 No	

Figure Front-11.License Agreement

- 6. If the MATLAB Runtime is already installed, click [Next] to continue.
- 7. The confirmation screen will appear. Click [Install] to install the MATLAB runtime software.



Figure Front-12. Confirmation Window

8. When installation is complete, click [Finish] to continue.



Figure Front-13.Installation Complete Window

Installation is now complete and the TETRA DL Signal Generator is now ready to run.

Running the TETRA DL Signal Generator

1. If you have added a shortcut to your desktop, you can double click it to run the program, otherwise go to START >TETRA_DL_Signal_Generator.



Figure Front-14.Start Menu

2. Enter the desired values for Base Color Code (BCC), Mobile Network Code (MNC), Mobile Country Code (MCC), Location Area Code (LAC), Frequency Offset, and Center Frequency, and then click [Generate File] button to generate your desired signal.

Note Do Not leave any field empty. Each field must contain an integer value within the specified range.

Signal Type	Base Station (DL) 🔻	File Name	TETRA_854p01	250_855_652_3
Extended Colo	r Code	Bsse	Station DL Cente	r Frequency
мсс	855	F	Frequency Offset	+12.5 kHz
MNC	652	C	enter Frequency	854.0125
BCC	3		Band Number	
LAC	43	c	hannel Number	216
Genera	te File			

Figure Front-15. Anritsu TETRA Signal Generator

3. Select the Folder where you want the save the custom pattern and click [Save] button.

Depending on the processor and Number of Multi-Frames selected, this process may take up to 30
 Note minutes. Do Not cancel the signal generation process or the program may hang and need to be restarted.

Select File to Write		×
← → ~ ↑ 🗔 > am-c1365	> Desktop v 🖏 🔎 Search D	esktop
Organize 👻 New folder		::: • ?
accy Documents Images	 Name Adobe Technical Communication Suite Captures 	Date modified 8/30/2021 6:31 AM 10/25/2021 2:46 PM
am-c1365 on SAHMED01 3D Objects Desktop		
Downloads Music		
📄 Pictures 📓 Videos 🏪 Local Disk (C:)	v <	>
File name: TETRA_854p0 Save as type: (*.txt)	250_855_652_3_43.txt	~
 Hide Folders 	Save	Cancel

Figure Front-16.Saving the Generated File

4. When the custom TETRA pattern is generated the pattern's name will be displayed as.txt file in the Status box.

MCC 855	Frequency Offset +12.5 kHz
MNC 652	Center Frequency 865.012
BCC 3	Band Number 8
LAC 43	Channel Number 2600
Generate File Status TETRA_865p0	1250_855_652_3_43.txt

Figure Front-17. Successful Pattern Generation Status

5. Locate the .txt file and copy it to a USB memory device.

Importing Custom TETRA DL Patterns

- 1. Power On the LMR Master S412E and wait until it finishes its power-up sequence.
- 2. Insert the USB memory device with TETRA pattern in the root directory.
- **3.** Select the TETRA Analyzer Mode.
- 4. Once the TETRA Analyzer mode is loaded, select Setup using the soft key at the bottom of the screen. Select the "Load Custom DL Pattern" button on the right edge of the screen.



Figure Front-18.Loading Custom DL Pattern

5. Locate the USB memory device and select the .txt file containing the TETRA pattern. Once highlighted, press the Enter key on the instrument.

/Inritsu 09/21/2021 0	3:05:32 pm 🛛 🎯•	*t.att. 📳		Recall
Recall				Sort By
				Name Type Date
Filetype: Txt Fi	le		-	Sort Order
	Scroll to File an	d Press Enter to Recall		Ascend Descen
				File Type
🗉 🚗 Internal Memory				Txt File
P USB 1				Refresh
— 🗉 🗂 System Volum	e Information			Disate
L TETRA_865p0125	0_855_652_3_43.04		09/21/2021 02:43:56 p.m.	Directories
0.00				
Frequency	Amplitude	Setup	Measurement	Turn Sig-Gen ON

Figure Front-19.Locating the TETRA file on the USB Memory Device

6. Press the Enter key on the instrument when prompted with LOAD PATTERNS message, to start loading the patterns.



Figure Front-20.Loading the DL Patterns

7. The custom pattern will begin loading and can take up to three minutes to complete. When done, press the Escape button on the instrument to exit.



Figure Front-21. Successful loading of the DL Patterns

8. Select CUSTOM PATTERN INFO from the Setup menu to confirm successful loading of the custom patterns.



Figure Front-22. Pattern Info Verification

- **9.** Press TX PATTERN from the Setup menu, and select CUSTOM DL option when PATTERN TYPE SELECTOR appears.
- **10.** Ensure the instrument's TX frequency matches the center frequency of the pattern and the amplitude is appropriate for the test. The pattern generated as shown below was made possible by connecting the signal generator output of the S412E to its Analyzer/RF In port. Note that the TETRA summary matches with the parameters set using the TETRA DL SIGNAL GENERATOR software.



Figure Front-23.TETRA Summary Table