World Map Tile Service (Mc7-WMTS)

User's guide

Version: 1.0.0

MapCore Version 7.9.5.0

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Introduction

Scope

The scope of this document is to guide the Mc7-WMTS user to install, configure and use the Mc7-WMTS server.

What is WMTS Server

WMTS is an OGC standard for a Web Map Tile Service (WMTS) interface Standard. A WMTS enabled server application can serve map tiles of spatially referenced data using tile images with predefined content, extent, and resolution. The Mc7-WMTS server is a WMTS enabled server application that implements the WMTS Standard over MapCore™ maps and render its data using MapCore's™ technology.

Intendant audience

This manual is intendant to be learned by site operators, system administrators, IT professionals or any other personnel who want to know how to install, configure and operate the WMTS server.

Additional information

Additional information about WMTS service can be read in OGC's "OpenGIS ® Web Map Tile Service Implementation Standard" Ver. 1.0.0. Issued by Open Geospatial Consortium Inc. (Ref: OGC 07-057r7 Date: 2010-04-06).

Terms and Definitions

Coordinate Reference System	Coordinate system that is related to the real world by a datum often referred as CRS
Coordinate System	Set of mathematical rules for specifying how coordinates are to be assigned to points
EPGS	IOPG's dataset which is a collection of definitions of coordinate reference systems and coordinate transformations which may be global, regional, national or local. Every CRS is identified by an EPSG code.
Feature	Abstraction of a real world phenomenon
Layer	Basic unit of **geographic information** that may be requested as a **map** from a **server**.
Map	Graphical presentation of geographic information as a digital image file suitable for display on a computer screen.
Terrain	Same as theme, as used in MapCore's™ terminology.
Theme	A group of layers that can be displayed separately or jointly.
Tile	A rectangular pictorial representation of geographic data, often part of a set of such elements, which can be uniquely defined by a pair of indices for the column and row along with an identifier for the tile matrix.
Tile matrix	A collection of tiles for a fixed scale.
Tile matrix set	A collection of tile matrices defined at different scales.

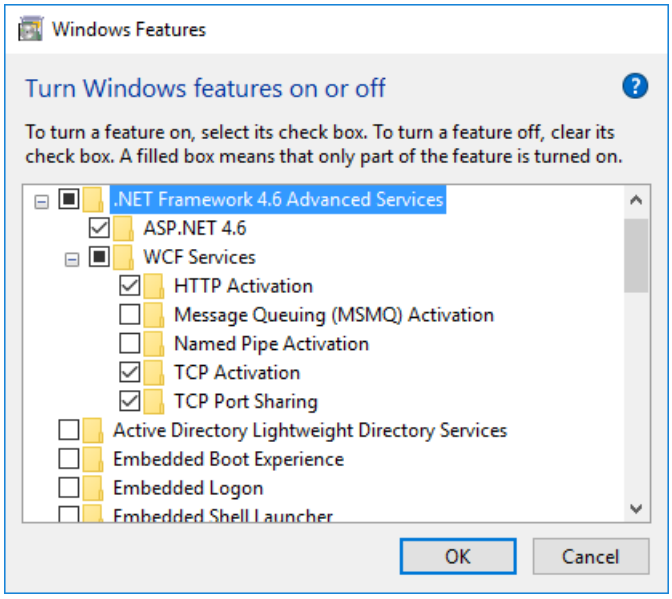
Installation

Prerequisites

The MC7-WMTS shall be used in only in 64Bit Windows (7 and above) machine.

Prior to installation, in windows 10, make sure that the .NET 4.X WCS Services are on. That is done in the following manner:

- Activate the control panel
- Select “Program and features”
- In the right tab click “Turn Windows features on and off”
- The following form will be shown:



- Select .Net Framework 4.X Advanced Services
    - Enable ASP.Net
    - Enable the following WCF Services – HTTP Activation, TCP Activation and TCP Port sharing.
- Click OK

Installation Process

Double click “Mc7WmtsSetup.msi” and wait for the installation to be completed.

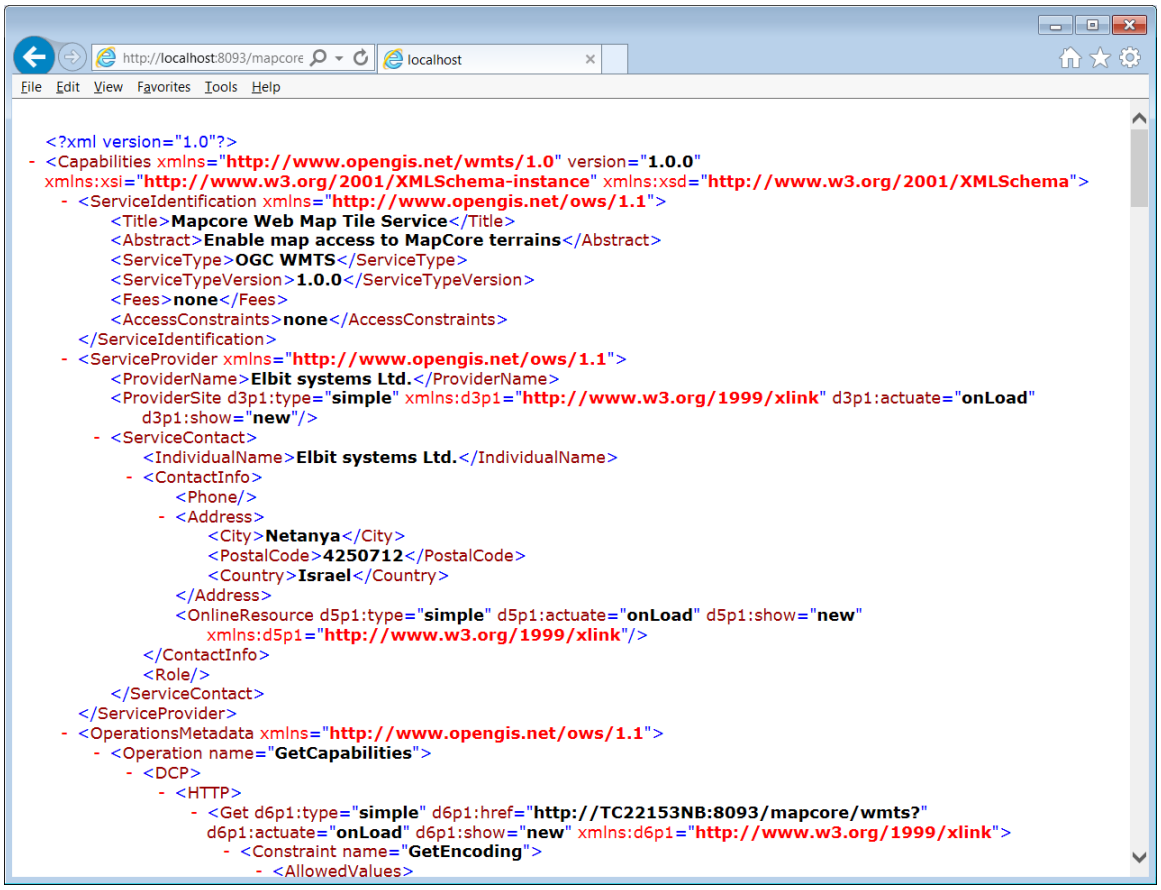
Test for a successful installation

To test the installation, run the server as described in "Running the server using the Start Menu".

When the server is up, start a web browser and enter the following url:

http://localhost:8093/mapcore/wmts?service=wmts

You should get the following in your browser:



After success stop the server as described in "Stopping the server".

Installation directories and files

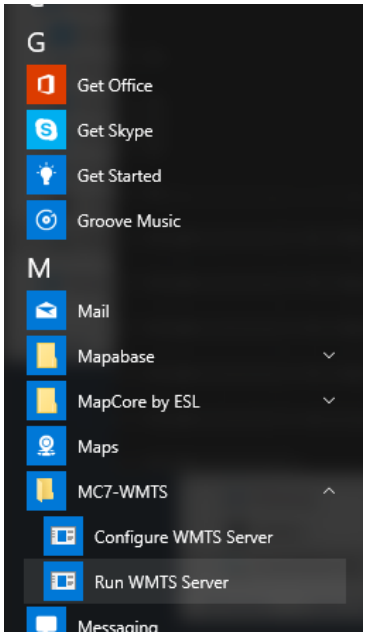
1. The software is installed under C:\Program Files\MC7Wmts All the files and folders in this installation folder must not be modified nor deleted.
2. The software data – i.e. configuration files as well as testing data and this document are installed in C:\ProgramData\Elbit Systems\Mc7WMTS. The data there is modifiable, however it is strongly recommended that you will use the server software configuration

mode to modify the data (as described in "Configuring the server") and not to modify the data manually to prevent configuration/data errors.

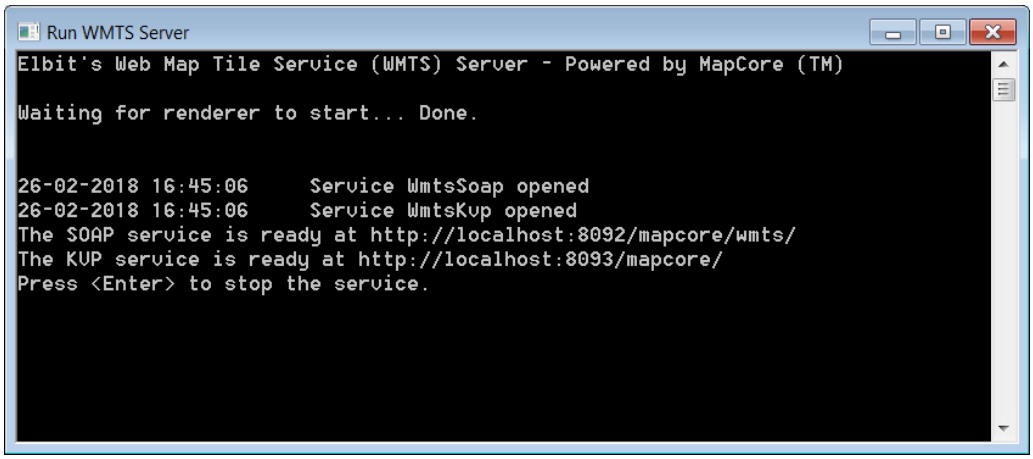
Running the server

Running the server using the Start Menu

1. Click the  icon at the bottom left of the screen (Start Menu).
2. Select "All Apps" – The following menu will be displayed.



3. Select "MC7-WMTS" and then Run WMTS Server
4. The following terminal window will pop up.



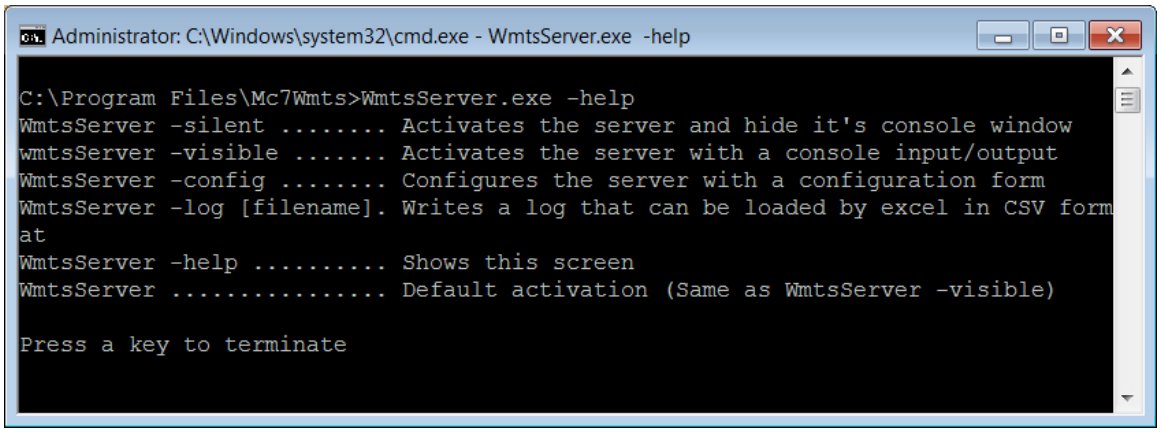
Running the server in command line

1. Run the command prompt
2. Perform the following commands
    a. CD "c:\Program Files\MC7Wmts"
    b. WmtsServer.exe

Command line switches

The WmtsServer.exe may be activated in different modes. The command line switches enables the user to determine in which mode the server will be run. The modes can be displayed by the following command: "WmtsServer.exe –help"

In such a case the following message will be displayed:



-visible The **–visible** switch is the default mode. The server is active within a console window, it output its messages into a console window, and the user can stop it by focusing the console window and hit enter.

-config The **–config** switch starts the server in configuration mode. In this mode a user form is displayed enable the user to change its configuration and to set the maps that will be served by the server. This mode will be further discussed in the next paragraphs. At the end of the configuration session the user will be prompt weather to continue with the service or to shut down.

-log [filename] The –log switch creates a CSV log file that records all tiles that are requested for render. The CSV file can be opened by Microsoft Excel and can be presented later as a table. [Filename] is an optional filename as a relative or

	absolute path. If it is not specified the default file name which is Wmts_log.csv is used. Paths are relative to the c:\ProgramData\Elbit Systems\MC7Wmts Folder. Since the log file may get very large in size, it is recommended to write a script that copy and splits the log file for a more manageable size portions in case an analysis is needed.
-silent	In this mode, the server is activated in the background and it is hidden from the user. It can be stopped only through the Task Manager.
-help	Display a help message as shown above

Stopping the server

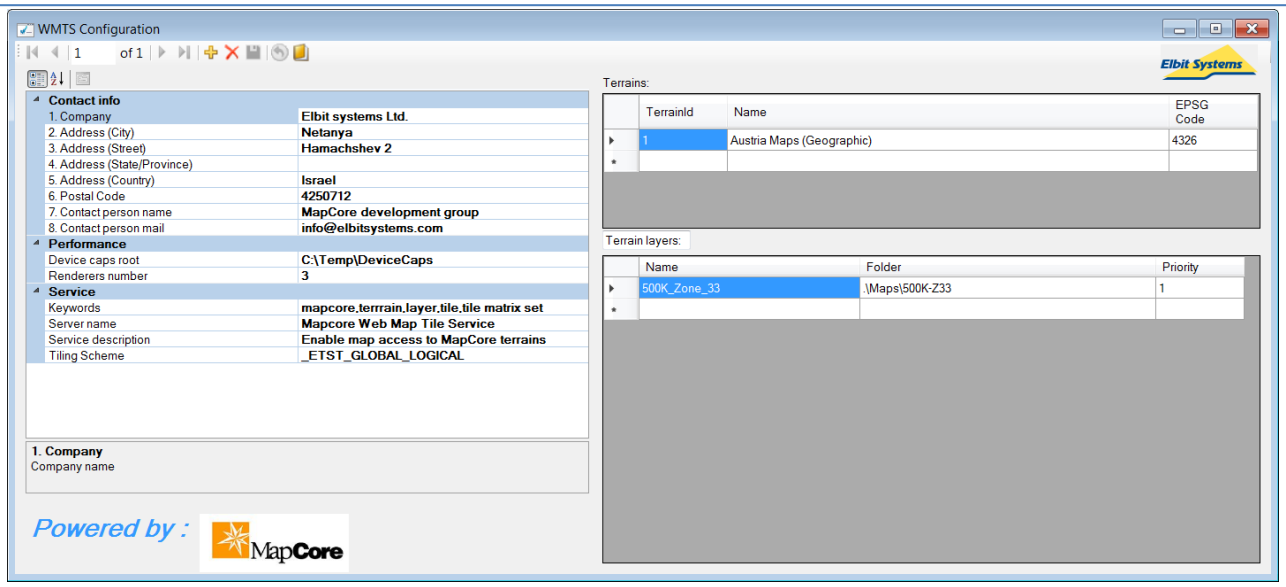
In case the server is running in visible mode, the user has to focus the server's command prompt and then click enter, then as a response to a question, the user has to confirm the server shutdown (by clicking "y"). The server may also be stopped using the task manager. That is done in the following manner:

1. Start the task manager (Start→TaskMgr)
2. Select The Processes tab
3. Find WmtsServer.exe and select it
4. Click "End Process"

Configuring the server

The server may be configured by Running "Configuring the server" from the start menu or by using the command "WmtsServer.exe –config"

Once the server is up in configuration mode the following form is displayed:



The left part is used to set the server initial parameters while the right part is used to configure the themes and layers to be served.

WMTS Configuration toolbar

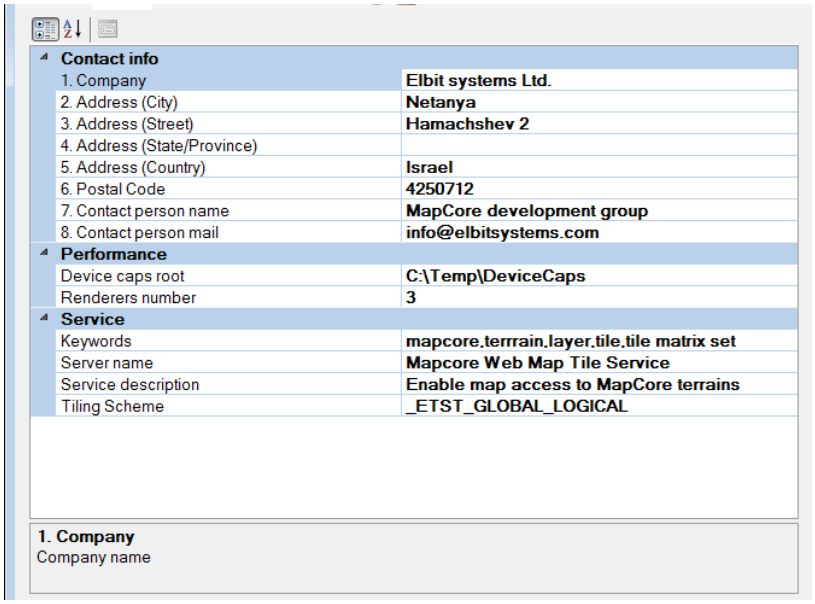
The toolbar is displayed at the top left of the WMTS Configuration window and it contains the following controls:

The following table layout the controls:

Symbol	Name	Type	Meaning
	Move first	Button	Moves the selected line to the first terrain (theme)
	Move previous	Button	Moves the selected line to the previous terrain
1	Current position	Label	Current terrain's line position
of 1	Total number of items	Label	Total number of themes
	Move next	Button	Moves the selected line to the next terrain
	Move last	Button	Moves the selected line to the last terrain
	Add new	Button	Adds a new empty terrain
	Delete	Button	Deletes the selected terrain
	Save data	Button	Saves the current changes
	Undo	Button	Returns to the last selected state
	Default Settings	Button	Returns to the default settings (Terrains are not included)

Setting server initial parameters

The server initial parameter is the left panel of the WMTS Configuration form. The following figure illustrates the panel with its factory settings:



Contact info section

This section sets the contact information returned by the server when the GetCapabilities service is called. It is often the contact info of the data provider which owns the server, probably your organization. The fields of this section are:

1. Company The company/organization name

2. Address (street) Street address of the company

3. Address (city) The name of the city in which the company is located

4. Address (state/province) The State/Province of the company's address

5. Address (country) The company's country

6. Postal code Zip code

7. Contact person name Full name of the person to contact with

8. Contact person mail E-mail of the contact person

Performance section

The performance section sets parameters affecting its performance. These parameters are:

Device caps root When working in silent mode, the server does not have an output

window. A window is normally attached to a real graphical device i.e. graphical interface. Since no window is attached in silent mode, the system needs to stores pseudo window information on a physical files which are located in a in a directory tree. The root of this tree is the parameter explained here.

Renderers number Each layer on each theme starts a renderer. A renderer is a thread that receives requests and renders tiles. The minimal number of renderers should be the total number of layers stored. The server will allocate more and more renderers for every layer in every theme until the total number of renderers reaches the **Renderers number** value. The renderers are stored in a pool and occupied only upon request. Therefore, as more and more renders are required simultaneously more and more available renderers will be occupied.

Service section

The service section sets parameters affecting the service in general. The parameters are:

Keywords The keywords associated with the server, all keywords are comma separated.

Server name The display name of the server.

Service description A description of the service provided by this server.

Tiling scheme Determines how the tiling matrix is cut and organized shall have one of the following values:

- **_ETST_GLOBAL_LOGICAL**

The two largest tiles start at (-180,-90) and (0,-90) degrees (longitude, latitude) and their dimensions are 180 by 180 degrees. The tile size is 256x256 pixels. That means that in zoom level 0 the whole planet fits into two side by side tiles.

- **_ETST_GOOGLE_CRS_84_QUAD**

The standard predefined tile matrix suggested by OGC for WGS84 geographic CRS (EPSG:4326) The largest tile starts at (-180,-180) degrees (longitude, latitude) and its dimensions are 180 by 180 degrees. The tile size is 256x256 pixels. That means that in zoom level 0 the whole planet coverage requires two tiles.

- **_ETST_GOOGLE_MAPS_COMPATIBLE**

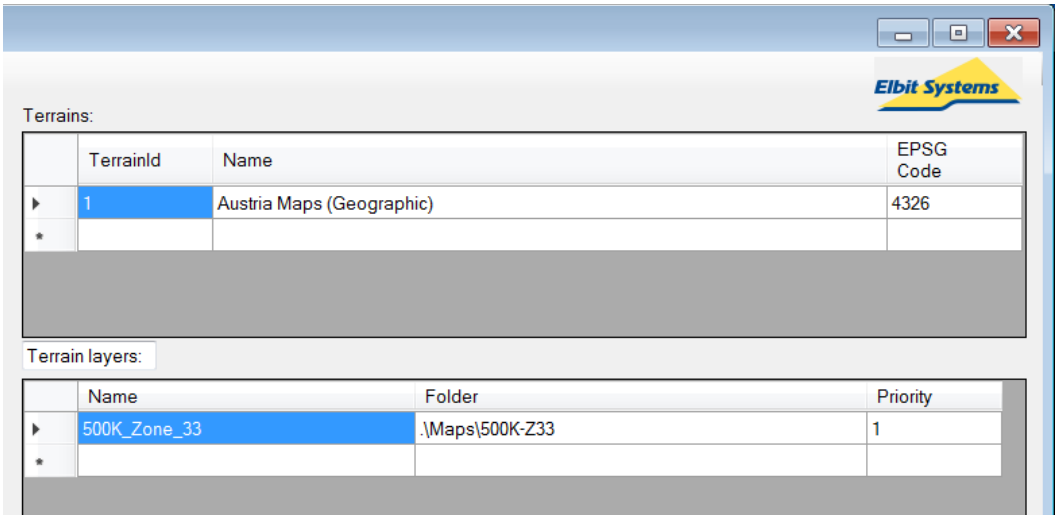
That matrix set fits Mercator projection of WGS84 used by Google maps (EPSG:93013).

- **_ETST_MAPCORE**

This matrix set is the default matrix set used by Mapcore™ based software.

Note: *When your client renders additional layers using other servers (or rendering software), use the mode that the other server uses. This will enhance your client performance.*

Setting terrain and layers



The WMTS configuration form right side controls the terrain and the terrain layers. The terrains are displayed at the top table as shown and controlled by WMTS configuration toolbar, while the terrain layers is a table that displays the layer content of the selected line of the top table. In the example shown here, there is only one terrain named "Austria Maps (Geographic)" that has one layer called 500K_Zone_33. This example is the standard map delivered with the installation used for practice and demonstration.

The following table describes the Terrain table:

Column	Meaning
TerrainId	An unique identifier for the terrain (Does not shown in the service level)
Name	The terrain name. Transferred from and to the server when connecting and rendering tiles.
EPSG Code	The CRS in which the terrain layers are geo-referenced. For instance Geographic (Lat/Lon) coordinates with WGS-84 Datum are referred as EPSG:4326.

The "Terrain layers" table consists of the following columns

Column	Meaning
Name	A unique name of the layer
Folder	Path for the underlying MapCore™ map. It can be an absolute path including drive or relative path that must start with ".\". In case of a relative path it will always be relative to the Server's Program data path – as explained in section "Installation directories and files"
Priority	A number specifies what the priority relationship between layers is. as the priority larger, so it will be rendered later (above) the previous layer.

Select a single terrain

Click at the column left to the first column of a certain row within the terrain table. The complete line will be marked.

Select a single layer

Click at the column left to the first column of a certain row within the terrain layers table. The complete line will be marked.

Adding terrains and layers

To add a terrain select the first column at the last empty row of the terrains table or select an occupied row and click the ***Add*** (+) button of the toolbar. An ID will be created automatically. The terrain layers table will be cleared. Add a name to the terrain. Then position into the terrain layer table and start filling rows.

Edit existing terrain and layers

To edit existing terrains or layers Just change a column contents, then change the focus into a different column/row.

Delete a single layer

To delete a single layer select the terrain, then select the layer and press the "Delete" keyboard key.

Delete a terrain

To delete a terrain select the terrain and click the ***Delete*** (X) toolbar button.

Completing the configuration

Saving the work

In order to save the work done, Click the ***Save data*** ( ) button. All changes will be saved.

Undo (Server initial parameters only)

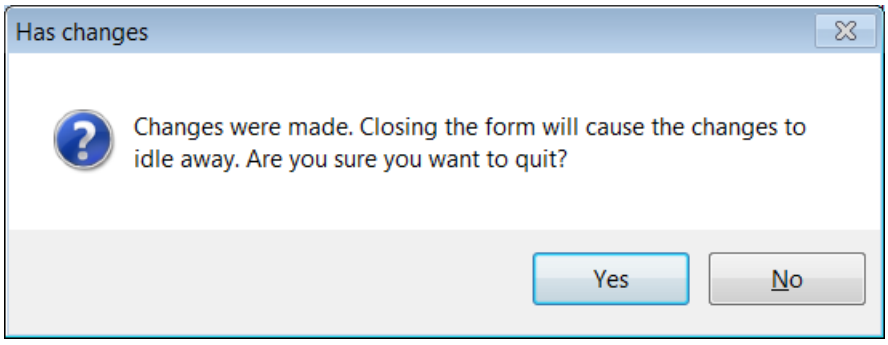
Clicking the ***Undo*** ( ) button will revert to the last initial parmeters saved. Note this does not affect the Terrain and its layers.

Default settings (Server initial parameters only)

Clicking the ***Default settings*** ( ) button will revert to the server initial parameters to its factory settings. Note, this does not affect the terrain and its layers.

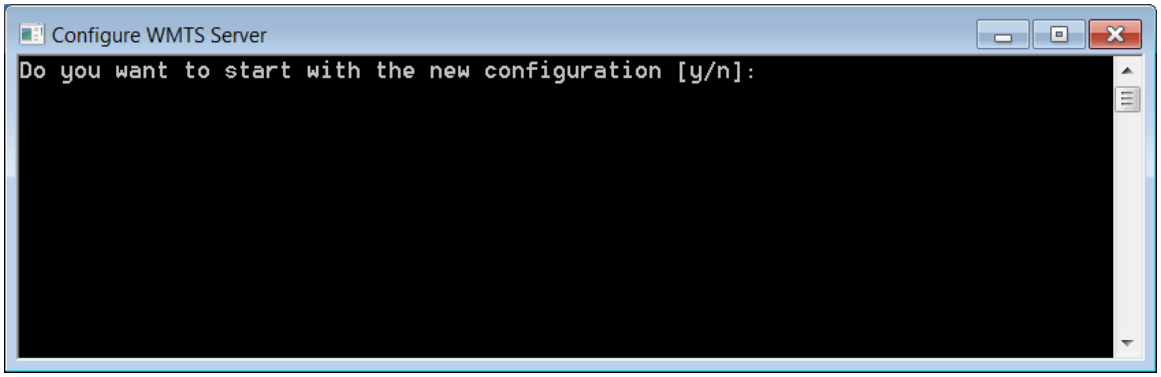
Exiting configuration mode

To complete work you need to close the configuration form by clicking the [X] at the right top of the form or by click Alt+F4 keys when the form is in focus. In case the data was changed but not saved the following dialog will popped up:



Clicking "***Yes"*** will close the form while clicking "***No"*** will return to the configuration form.

After the form is closed the console window will prompt to the user as shown here:



Selecting Y or "y" will start the server with the modified configuration.

Client Mc7-WMTS Usage

Prerequisites

The server needs to be configured and up. For more information, see "Configuring the server" and "Running the server" sections.

Client Application URL

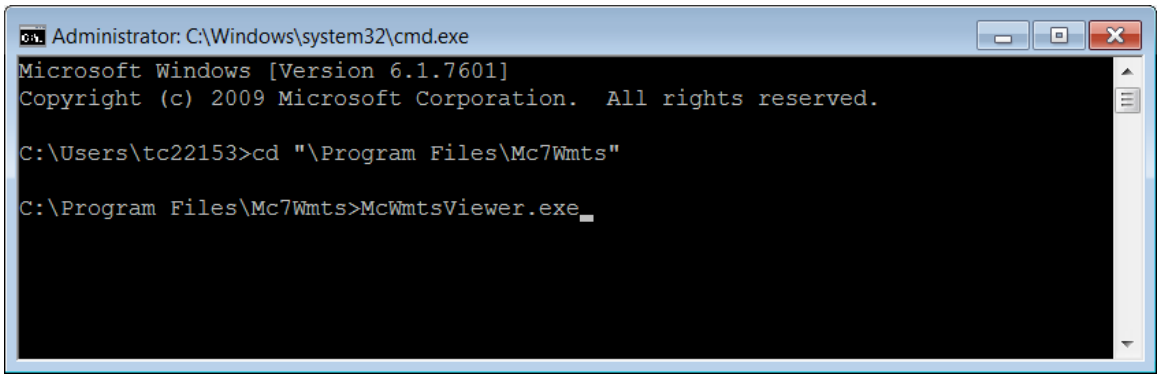
In order to use the WMTS service, the client application needs to use the following URL prefix: http://<computer_name>:8093/mapcore/wmts ....

Server's content viewer Application

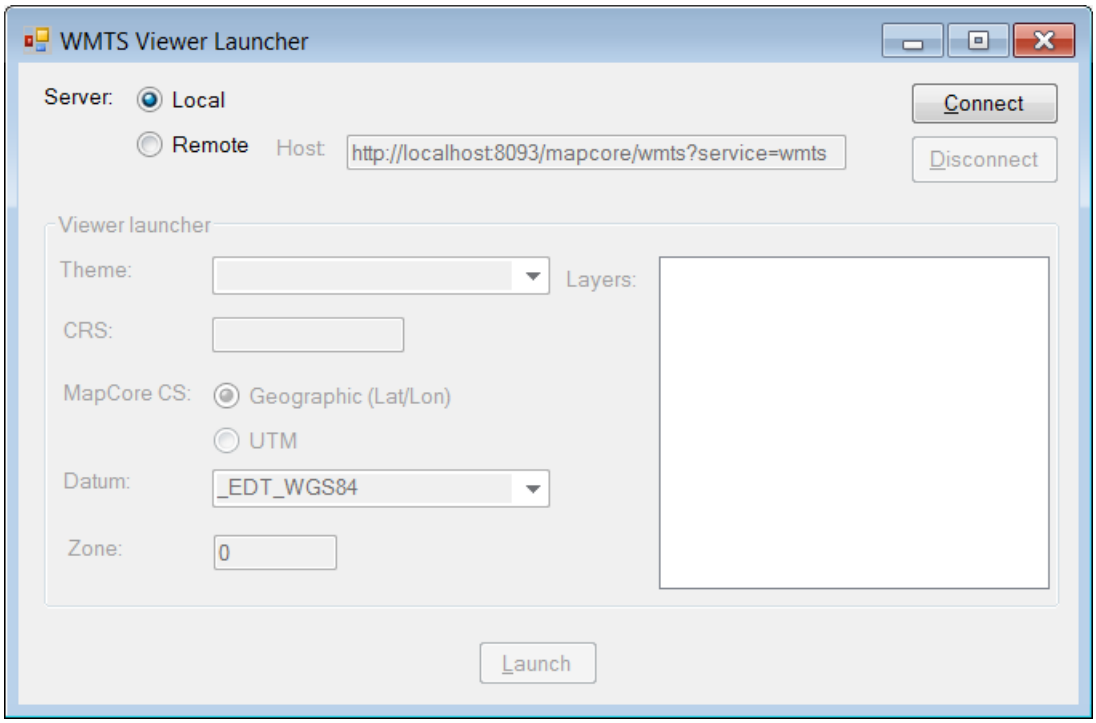
In order to assist the administrator to view the server's content a viewer tool was added to the installation package. Although the tool is not a part of the server's content, one can find it very useful to use this viewer for administrative purposes. This tool can also help troubleshooting configuration error and client reported problems. The tool is located in:
C:\Program Files\Mc7WMTS\McWmtsViewer.exe
In order to help by setting a working example, the server is preconfigured with a single map (1:500K within Austria). Therefore, activating the tool after a fresh installation will view this map.

Activating the viewer tool

Using the command tool use the following commands:

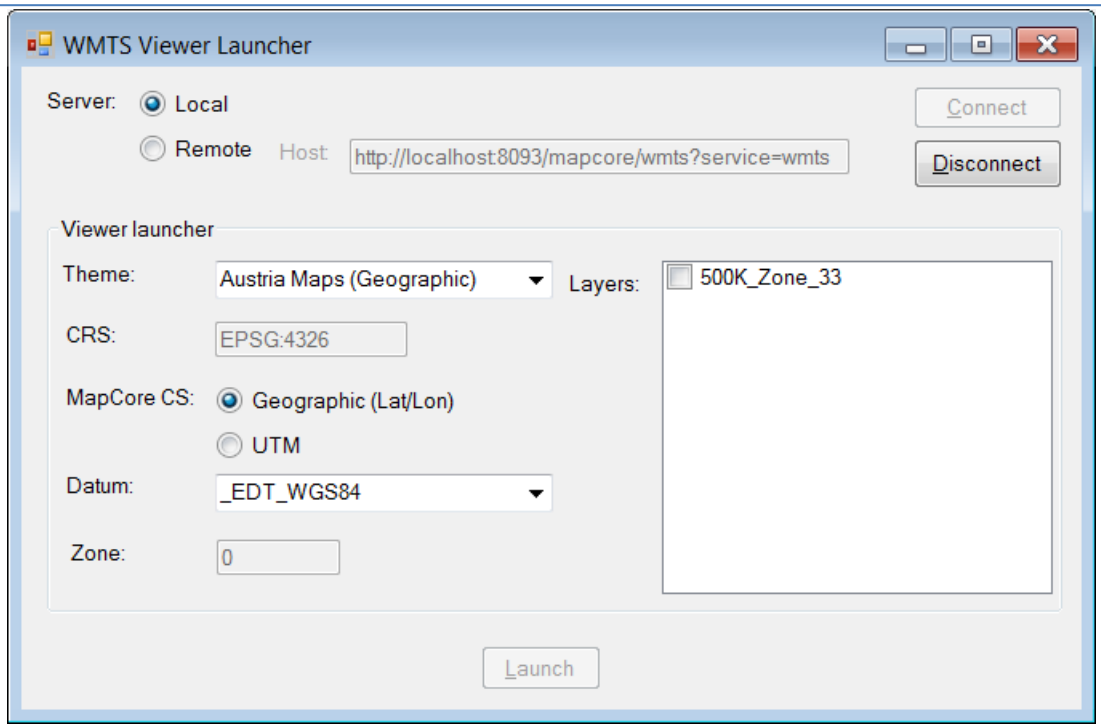


The application will come up with the following form:



In case the WMTS server runs in the local machine, the ***Local*** radio button needs to be selected, otherwise select ***Remote*** and enter the server's URL in the Host field.

Click ***Connect*** The following will be shown:



The following fields will be filled:

Theme — A list of available theme, the first one is shown. The user may change the theme by clicking the arrowhead and selecting a different theme. Since themes are not mandatory by the OGC-Standard, some commercial server might not have themes at all leaving this field empty. In MC7-WMTS however, the usage of themes is mandatory.

Layer — All available layers of the currently selected theme. In case no themes exists,

CRS — For information only – shows the EPSG code of the selected theme. In case no theme exists, it will show the EPSG code of the first layer in the list.

Selecting the viewer's coordinate system:

Before viewing the data, the viewer coordinate system needs to be set. In MapCore, EPSG code is not supported (yet) and therefore the user needs to select manually the CRS that will be used by the viewer.

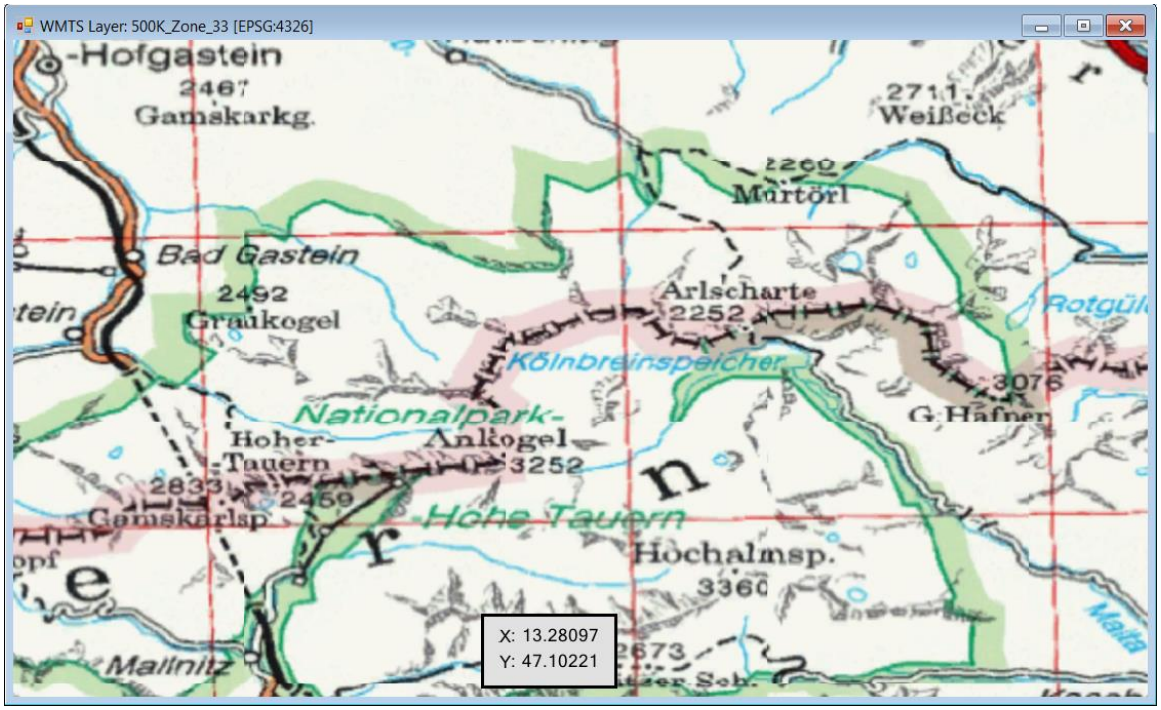
In most cases servers maps the data in geographic (Lat/Lon) and WGS-84. In case the data is in UTM, just select UTM and fill the UTM zone's field. In case the datum is not WGS84 – select the appropriate datum from the list.

Note: *In case the coordinate system selected is different from the coordinate system used by the server, you will still be able to view the maps; however the coordinate's values shown will be differ from the real one on the map.*

Viewing layers

- Select a theme (If exists)
- Check the boxes near each of the layers you wish to view
- The ***Launch*** button will become enabled
- Click the ***Launch*** button.

The following window(s) will appear. Each of each selected maps:



Layer's window activation

The following activities can be done over the WMTS Layer window:

Viewing cursor coordinates	Position the mouse over the map. The coordinates will show the mouse position.
Hide the cursor position box	Click within the box. It will disappear.
Show the hidden box	Double click anywhere in the map. The box will re-appear.
Pan (drag) the map	Drag the map while the mouse's left key is pressed, the map will be dragged until you release the left mouse key.
Zoom (in and out)	Use the mouse wheel to change the map's zoom. Roll it forward to zoom-in, and backwards to zoom-out.
Tilt (Rotate) the map	The map can be rotated by dragging it while the CTRL key is pressed. The map will be rotated around the center of the displayed area
Align to the north	Double click anywhere within the tilted map. It will be rotated back to 0 degrees so it will be aligned to the north.

Closing the viewer/ viewer window

In case you done using the application, just close the main window. It will close all opened viewer windows for you and exit. If you just interested in closing the current layer's viewer window close it and it will be closed without shutting down the application.

reconnecting the server

In case you wish to reconnect i.e. different server or a different configuration while the viewer is still displaying the previous window do as follow:

- Close each of the viewer's windows except for the main window
- Click ***Disconnect***
- Select ***Local*** or ***Remote***, if remote was selected enter the server's URL
- Click ***Connect***
- Select CRS and launch the viewer as explained previously.