# Оглавление

1 **Introduction**  
   1.1 About NextGIS Mobile ........................................... 1  
   1.2 Hardware and software requirements ............................. 2  

2 **Installation** .................................................. 3 

3 **Authorization** .................................................. 4  
   3.1 Via on-premise (NGIDOP) ......................................... 4  

4 **User interface (UI)** .............................................. 5  
   4.1 Main screen ....................................................... 5  
   4.2 Layers tree ....................................................... 6  
   4.3 Features table .................................................... 8  
   4.4 Settings dialogue ................................................ 9  
   4.5 Useful features .................................................. 13  

5 **Adding layers** .................................................. 15  
   5.1 Creating new vector layer ....................................... 15  
   5.2 Creating vector layer from GeoJSON data ....................... 17  
   5.3 Creating vector layer from Custom forms (NGFP) .............. 20  
   5.4 Creating raster layer from Tile cache (XYZ/TMS) ............ 21  
   5.5 Creating raster layer from Tile cache (NGRC) ............... 27  
   5.6 Creating raster layer from external geoservice .............. 27  
   5.7 Geodata uploading and web-maps creation using geodata from your Web GIS ...................................................... 32  

6 **Editing layers** .................................................. 37  
   6.1 Switching to Edit mode ......................................... 37  
   6.2 The Editing Toolbar ............................................. 37  
   6.3 Adding features ............................................... 39  
   6.4 Adding current location ....................................... 46  
   6.5 Adding line or polygon by walk ................................ 46  
   6.6 Editing a geometry ............................................. 47  
   6.7 Editing attributes ............................................. 51  

7 **Tracks** ............................................................ 57  
   7.1 Recording a track .............................................. 57  
   7.2 Managing recorded tracks ...................................... 61  

8 **Exporting data** .................................................. 64
1.1 About NextGIS Mobile

NextGIS Mobile is a mobile GIS (Geographic Information System) for Android OS.

NextGIS Mobile allows to:

- create and display a multi-layered map;
- perform map navigation (panning, zooming in and out);
- add vector data in GeoJSON format;
- add raster data as a tile cache;
- add online tile sources (XYZ and TMS);
- add raster and vector layers from nextgis.com\(^1\) and NextGIS Web\(^2\);
- create and modify vector geodata (geometries and attributes);
- browse the attributes of selected geometry through identify dialog;
- modify vector layer attributes with customizable input forms;
- share vector geodata using standard Android tools;
- record the tracks and manage their display parameters, remove selected or all tracks;
- display device coordinates, velocity, altitude on the map, as well as a source of geographical coordinates and amount of satellites used for georeferencing (when GPS is in use);
- collect geodata and transmit it to nextgis.com\(^3\) or NextGIS Web\(^4\) in background mode (when internet connection is on).

NextGIS Mobile is open source (license GPL v3 (c. 94)).

Some icons used in NextGIS Mobile are from:

\(^1\) https://my.nextgis.com/signup/?next=/webgis/
\(^2\) http://nextgis.com/nextgis-web/
\(^3\) https://my.nextgis.com/signup/?next=/webgis/
\(^4\) http://nextgis.com/nextgis-web/
1.2 Hardware and software requirements

To launch NextGIS Mobile you need a device (smartphone, tablet, etc.) with Android 2.3 or higher.

To be able to use all NextGIS Mobile features the device should have the following hardware:

- **GPS** and/or **GLONASS** sensor;
- digital compass;
- cellular module;
- rear camera.

**Note:** If any of these items are missing from the device, the related functions will not be available.

NextGIS Mobile does not impose specific system requirements. However, the amount of system memory and storage space can limit the size of uploaded geodata.

---

6 [http://creativecommons.org/licenses/by-nd/3.0/](http://creativecommons.org/licenses/by-nd/3.0/)
8 [http://creativecommons.org/licenses/by/3.0/](http://creativecommons.org/licenses/by/3.0/)
NextGIS Mobile can be installed:

- using an APK file `nextgismobile.apk`\(^9\);
- from Google Play\(^{10}\).

To install “NextGIS Mobile” from the APK file first allow installation of apps from unknown sources (“Settings” -> “Privacy” -> “Unknown sources”). After installation you can deactivate this option.

To install application from Google Play launch Google Play app, enter “NextGIS Mobile” in the search bar and install the application.

To launch NextGIS Mobile use a shortcut created automatically during its setup (see Fig. 2.1).

![Application shortcuts](image)

Рис.2.1: Application shortcuts.
NextGIS Mobile shortcut is highlighted by the orange rectangle.

3.1 Via on-premise (NGIDOP)

For authorization in NextGIS Mobile via on-premise, specify the appropriate Endpoint in the authorization settings (Menu -> Settings -> Account -> Sign in -> Change authorization server) (Fig. 3.1). If you’re already logged in with my.nextgis.com - log out first.

Рис.3.1: Adding your own authorization server in NextGIS Mobile
There are 4 major elements of NextGIS Mobile UI:

- Main screen
- Layers tree panel
- Features table
- Settings dialogue

UI is designed in accordance with Google Material design guidelines.

4.1 Main screen

Main screen is shown on Fig. 4.1.

The number of buttons in top toolbar depends on your device screen size. If the buttons don’t fit into the toolbar they are moved to the contextual menu (item 5 in Fig. 4.1).

**Top toolbar** contains the following buttons:

- Show my location
- Load or refresh geodata
- Start new track
- Settings
- Help

**Status info panel** (item 9 in Fig. 4.1) can be shown at the bottom of the Main screen (if it is activated in the Settings - Map - Show status info panel). Status info panel shows (if there is the fixed location):

- Device coordinates (latitude and longitude);
- Positioning signal source (mobile networks/Wi-Fi or satellite) and number of captured satellites (if positioning is carried out with help of GPS/GLONASS);
- Device altitude (meters);
- Device speed (kmph)

---

11 [http://www.google.com/design/spec/material-design/introduction.html](http://www.google.com/design/spec/material-design/introduction.html)
The numbers indicate: 1 - Layers tree panel icon; 2 - Application title; 3 - “Show my location” button; 4 - “Load/Refresh geodata” button; 5 - Contextual menu icon; 6 - Measuring button; 7 - Map screen; 8 - Main actions button; 9 - Status info panel.

Depending on the size of the screen Status info panel can occupy one or two rows.

A map (item 7 in Fig. 4.1) is a set of raster and vector layers. The order and the visibility of layers are under control of layers tree (Layers tree (c. 6)).

After a long hold of your finger on the vector layer’s geometry the map window turns to the select mode.

### 4.2 Layers tree

Layers tree panel is designed to display the content of a map and to control visibility and hierarchy of map layers. Additional operations with layers are available from a separate layer contextual menu. Layers tree panel is shown on Fig. 4.2.

To change the hierarchy of map layers long-press the layer which is to be moved up or down. Layers tree panel will switch to Edit mode. Keep pressing and move the selected layer to its new position.

For turning layer visibility on/off tap on Layer visibility button (item 3 in Fig. 4.2). “Add geodata” button (item 4 in Fig. 4.2) allows you to create vector layers and import vector and raster layers from Android local storage, QuickMapServices
The numbers indicate: 1 - Layer type; 2 - Layer name; 3 - Layer visibility button; 4 - Add geodata; 5 - Layer contextual menu icon; 6 - Layer contextual menu items.

catalog\textsuperscript{12}, nextgis.com\textsuperscript{13} or NextGIS Web\textsuperscript{14}. This button contains the next menu (Fig. 4.3):

- Create layer;
- Open local;
- Add geoservice;
- Add from NextGIS.

By using “Open local” menu item you can upload \textit{geodata} from local storage in one of the following formats:

- GeoJSON file;
- ZIP file with cached tiles;
- *.ngrc file
- *.ngfp file.

More information about geodata upload can be found in “\textit{Adding layers} (c. 15)” section.

Layer contextual menu depends on layer’s type (whether it is vector or raster layer). When you tap the Contextual menu button (item 5 in \textbf{Fig. 4.2}) contextual menu items pop up as shown by item 6 in \textbf{Fig. 4.2}.

\textsuperscript{12} https://qms.nextgis.com/
\textsuperscript{13} https://my.nextgis.com/signup/?next=/webgis/
\textsuperscript{14} http://nextgis.com/nextgis-web/
4.3 Features table

Features table is designed to show and manage the contents of each vector layer in table format.

To open Features table activate Layers tree panel and tap on the Contextual menu button next to the vector layer name (item 5 in Fig. 4.2). This will pop up the contextual menu items as shown by item 6 in Fig. 4.2. There you need to select “Features table”. Depending on the screen size the panel could occupy the whole screen or just the right side (in this case there is a map with a highlighted geometry of the current attributes on the left side).
Features table opens as shown in Fig. 4.4 below.

![Features Table]

If you tap any record (row) in the table, the Features table toolbar appears at the bottom of the screen. This toolbar allows to manage features as shown below in Fig. 4.5.

You can open the standard Features table editing form as shown in Fig. 6.6 by selecting “Open Features table editing form” (see item 8 in Fig. 4.5)

**Warning:** If you tap on “Delete” button (see item 7 in Fig. 4.5), the system will delete the selected feature immediately. You will be able to undo the removal, but if undo action is not applied in 5 seconds after removal, the feature gets deleted permanently.

### 4.4 Settings dialogue

Depending on the screen size Settings dialogue can fit into one or two panels. Settings dialogue is shown on Fig. 4.6 (one panel mode).

There are following Settings on the main panel:

- General
- Map
- Location
- My tracks
Рис. 4.5: Features table toolbar.
The numbers indicate: 1 - Close Features table; 2 - Layer name; 3 - Features attributes; 4 - Close toolbar; 5 - Selected feature ID; 6 - Show selected feature on the map; 7 - Delete selected feature; 8 - Open Features table editing form.

Рис. 4.6: Settings.

4.4. Settings dialogue
• Web GIS
• Account

“General” settings allow to change basic settings of the map (see Fig. 4.7).

Here you can select the theme (Light or Dark) and tune up compass settings.

“Map” settings allow to change basic settings of the map (see Fig. 4.8).

Map settings include:

• Show/hide Status info panel
• The way current location displays (show current location, show marker, how marker & accuracy radius)
• Show mini compass
• Do not turn off the screen when map displays - works only on the map screen
• Show/hide zoom control buttons
• Show scale ruler
• Show measuring button
• Coordinates format (for coordinates in Status bar and other dialogs and screens)
• Decimal places
• Map background (light, dark, neutral)
• Map path (here you can specify a path where map and layers data will be stored)

**Note:** For devices with several SD cards and Android 4.4 and higher, map path not on the main SD card can only be specified in the application home directory and its subdirectories (for example: Android/data/com.nextgis.mobile). This is also true for some devices without root access. Read-only folders won’t show up in path selection dialog.

“Location” settings offer a few location specific settings (see Fig. 4.9).

Location settings include:

• Coordinate source (mobile networks/Wi-Fi + GPS, Other networks or only GPS)
• Minimum update time
• Minimum update distance
• Count of GPS fixes

“Tracks” settings are similar to the location settings, but they are applied only for track recording.

**Note:** If you set value of the minimum update distance at more than 5 m, the operating system will start to smooth the track (remove outliers).
4.5 Useful features

From the Main screen itself you can access a couple of features useful in the field.

4.5.1 Show my location

To know your current location, just tap on the “Show my location” button (see item 3 in Fig. 4.1 above). This will show your current location on the map screen with a marker. If your Status info panel (see item 9 in Fig. 4.1 above) is switched on via appropriate Map settings (see Fig. 4.8) you’ll also be able to view the relevant information there.

Note: Your “Location” settings must be switched ON in your Android mobile settings.

4.5.2 Measure distance and area

It is possible to measure the distance between two points directly on the map screen. Just tap on the Measuring button on Map screen (see item 6 in Fig. 4.1 above). Tap on your starting point (a new point in Edit mode will appear on the screen). Then tap on your finishing point (a second point in Edit mode and line between the points will appear on the screen). The distance between two points will be shown in Top toolbar. See Fig. 4.10 below for illustration.
Position of any point may be edited by tapping on it and dragging it to the correct location.

You can add additional points to measure distance of angled lines and smooth curves, as well as measure areas of the formed polygons.

To exit Measure mode tap the blue tick button in the corner of the screen (see item 7 in Fig. 4.10).

**Note:** To use this feature “Show measuring button” checkbox must be switched ON in Map settings (see Fig. 4.8).
NextGIS Mobile allows to create new empty vector layers or import vector and raster layers from Android local storage, QuickMapServices catalog\textsuperscript{15}, nextgis.com\textsuperscript{16} or NextGIS Web\textsuperscript{17}. The supported data types are:

- GeoJSON;
- XYZ/TMS tile cache in ZIP-archive;
- tile cache in *.ngrc format;
- custom forms in *.ngfp format.

### 5.1 Creating new vector layer

Here are the steps to create an empty vector layer:

1. Open Layers tree panel (item 1 in Fig. 4.1). Then tap on “Add geodata” button (item 4 in Fig. 4.2). The dialogue will open as shown in Fig. 5.1. Select “Create layer”.

2. In the opened dialogue enter the parameters of new vector layer (see Fig. 5.2)

The standard form for the creation of new vector layer contains the following parameters:

1. Layer name - enter the name of layer which will be displayed in the layers tree.

2. Geometry type - select layer geometry type (point, linestring, polygon, multipoint, multilinestring, multipolygon).

3. Fields - list of fields which can be added, edited or deleted. These are attribute values of the layer.

You can add as many attributes for a new vector layer as you like. To add a new attribute tap on “+” button next to “Fields”. This will open a new dialogue for creation of each new field (see Fig. 5.3).

Dialog for creation of a new field contains the following parameters:

\textsuperscript{15} https://qms.nextgis.com/
\textsuperscript{16} https://my.nextgis.com/signup/?next=/webgis/
\textsuperscript{17} http://nextgis.com/nextgis-web/
Рис. 5.1: Add geodata dialogue.

Рис. 5.2: Parameters of the new vector layer.

5.1. Creating new vector layer

16
1. Field name – enter the name of the field.

**Note:** The field name can only be entered in Latin characters (letters and numbers!) without spaces. It should also differ from SQL reserved keywords.

2. Field type - select field type from one of the following types: string, integer, real, date&time, date, time.

### 5.2 Creating vector layer from GeoJSON data

NextGIS Mobile allows to create a vector layer by importing an existing GeoJSON file. To open data in GeoJSON format:

1. Open Layers tree panel (item 1 in Fig. 4.1). Then tap on “Add geodata” button (item 4 in Fig. 4.2). The dialogue will open as shown in Fig. 5.1. Select “Open local”.

2. Select GeoJSON file from your mobile device storage (see Fig. 5.4). For example, tap on the file “Roads.geojson” to import the “Roads” vector data file.

3. When the file is selected Layer settings dialogue opens. Here you can specify a new vector layer name or keep the name as it is, e.g. “Roads” (see Fig. 5.5).

4. Pressing “Create” button starts data processing for creation of a new layer.
5.2. Creating vector layer from GeoJSON data
**Note:** In case of GeoJSON file importing the new layer will always be a vector layer!

You can check if the new layer was created successfully in the layers tree panel. The newly created layer will be shown up in the layers tree (see Fig. 5.6). The “Roads” layer is marked in orange rectangle.

![Layers tree panel](image)

**Fig. 5.6:** Layers tree panel.

**GeoJSON: format requirements**

- *Coordinate system* of input geometries can be WGS 84 (EPSG:4326) or Web Mercator (EPSG:3857) only. If input file has different coordinate system you will see a warning message about unsupported coordinate system.

- All geometries in the file must be of the same type. If input file contains varying types of geometry in the output you will have a file with geometries type that coincides with the type of first record, i.e. geometry of first entry will determine the type of layer geometry.

- Text strings must be encoded in UTF-8 format.

**Note:** You can read more about GeoJSON format in its specification[^18]. GeoJSON is based on JSON format (see RFC 4627[^19]).

You can only use standard attributes form (not custom *.*ngfp form) for editing GeoJSON layer.

[^18]: http://geojson.org/
[^19]: https://www.ietf.org/rfc/rfc4627.txt
The standard attributes form contains only following three fields:

1. Text field for entering characters or digits.
2. Dialogue for entering date & time.
3. “Add pictures” button.

A sample standard attributes form is shown below in Fig. 5.7.

You can further perform standard edit operations like Add, Modify or Delete operations for this layer. For more information about GeoJSON layer editing see Editing a geometry (c. 47).

5.3 Creating vector layer from Custom forms (NGFP)

NextGIS Mobile allows to create a vector layer by importing an existing NGFP file. NGFP files can be generated using NextGIS FormBuilder\(^{20}\). NGFP is a GeoJSON file with additional information (JSON) which is packaged in zip archive and has .ngfp extension.

NGFP file allows to use custom (not standard) attributes forms optimized for attributes viewing and editing. Custom form may contain special controls for editing, such as dropdown lists, radio buttons or linked lists.

Follow these steps to open NGFP file in NextGIS Mobile:

\(^{20}\) http://nextgis.com/nextgis-formbuilder/
1. Open Layers tree panel (item 1 in Fig. 4.1). Then tap on “Add geodata” button (item 4 in Fig. 4.2). The dialogue will open as shown in Fig. 5.1. Select “Open local”.

2. Select NGFP file from your mobile device storage (see Fig. 5.9). For example, tap on the file “Structures.ngfp” to import the “Structures” form.

3. When the file is selected Layer settings dialogue opens. Here you can specify a new vector layer name or keep the name as it is, e.g. “Structures” (see Fig. 5.10):

4. Pressing “Create” button starts data processing for creation of a new vector layer.

You can check if the new layer was created successfully in the layers tree panel. The newly created layer will be shown up in the layers tree in the layers tree (see Fig. 5.6). The “Structures” layer is shown in orange rectangle.

You can further perform standard edit operations like Add, Modify or Delete operations for this vector layer. For more information about NGFP layer editing see Editing a geometry (с. 47).

5.4 Creating raster layer from Tile cache (XYZ/TMS)

NextGIS Mobile allows to create a raster layer by importing tile cache. Tile cache is a zip-archive with folders and tiles stored in accordance with a tiling

5.4. Creating raster layer from Tile cache (XYZ/TMS) 21
5.4. Creating raster layer from Tile cache (XYZ/TMS)

Рис.5.9: Android local storage.

Рис.5.10: Layer settings dialogue.
scheme (for example, folder_z/folder_x/y.png). Folders of level Z can be located in the root or in a folder in the root folder (name of the folder doesn’t matter, but there have to be only one folder). Deeper nesting of level Z folders is not allowed.

Tile cache can be created with the extension module NextGIS QGIS - QTiles\(^\text{21}\). Resulted archive can be uploaded to any available folder in your mobile device storage.

Follow these steps to open zip-archive with tile cache:

1. Open Layers tree panel (item 1 in Fig. 4.1). Then tap on “Add geodata” button (item 4 in Fig. 4.2). The dialogue will open as shown in Fig. 5.1. Select “Open local”.

2. Select zip-archive from your mobile device storage (see Fig. 5.12). For example, tap on the file “mapnik.zip” to import the tile cache:

3. When zip-archive is selected a layer settings dialog opens (see Fig. 5.13):

   Here you can select tile layer type (tile structure system) - XYZ (OSM) or TMS (OSGeo) (see Fig. 5.14) and in-memory cache size (see Fig. 5.15):

4. Pressing “Create” button starts data processing for creation of a new raster layer (see Fig. 5.16).

You can check if the new raster layer was created successfully in the Layers tree panel. The newly created raster layer will be shown up in the layers tree first in the Layers tree (see Fig. 5.17).

\(^{21}\) [http://plugins.qgis.org/plugins/qtiles/](http://plugins.qgis.org/plugins/qtiles/)
Рис.5.12: Android local storage.

Рис.5.13: Tile layer settings dialog.
5.4. Creating raster layer from Tile cache (XYZ/TMS)
5.4. Creating raster layer from Tile cache (XYZ/TMS)

Рис.5.16: Data processing for creation of a new layer from tiles.

Рис.5.17: Layers tree panel.
5.5 Creating raster layer from Tile cache (NGRC)

NextGIS Mobile also allows to create a raster layer by importing tile cache in *.ngrc format. NGRC files can be created from virtually any geodata in QGIS using our QTiles plugin.

Follow these steps to import tile cache in *.ngrc format:

1. Open Layers tree panel (item 1 in Fig. 4.1). Then tap on “Add geodata” button (item 4 in Fig. 4.2). The dialogue will open as shown in Fig. 5.1. Select “Open local”.

2. Select *.ngrc file from your mobile device storage (see Fig. 5.18). For example, tap on the file “Tandali_Wadgaon.ngrc” to import the “Tandali Wadgaon” tile cache prepared using satellite raster image.

3. NextGIS Mobile will start data processing for creation of a new raster layer. You can check if the new layer was created successfully in the Layers tree panel. The newly created layer will be shown up in the layers tree in the layers tree as shown in (see Fig. 5.19). The “Tandali_Wadgaon” layer is shown in orange rectangle.

5.6 Creating raster layer from external geoservice

NextGIS Mobile also supports creation of raster layers from external geoservices.
Warning: You need to be Online while creating layer from external geoservice. It will consume your data pack & apply standard Internet charges from your Internet service provider.

5.6.1 Creating raster layer from QuickMapServices tile service

Follow these steps to add raster layer from TMS services listed in QuickMapServices catalog:\(^{22}\):

1. Open Layers tree panel (item 1 in Fig. 4.1). Then tap on “Add geodata” button (item 4 in Fig. 4.2). The dialogue will open as shown in Fig. 5.1. Select “Add geoservice” and the dialogue will open as shown in Fig. 5.20 below.

2. Select a geoservice you want to add and tap “Add” to create raster layer from that service. The newly created layer will be shown up in the layers tree in Layers tree.

5.6.2 Creating raster layer from private tile service

If you want to add tile service not listed in QuickMapServices catalog\(^ {23}\) you can do it by following these steps:

---

\(^{22}\) [https://qms.nextgis.com/](https://qms.nextgis.com/)

\(^{23}\) [https://qms.nextgis.com/](https://qms.nextgis.com/)
1. Tap “New” in above Fig. 5.20. It will open up “Create” dialogue for a new TMS service as shown in Fig. 5.21 below.

2. Specify Layer name & Layer URL. Layer URL should specify location of X value (number of tile by horizontal), Y (number of tile by vertical) and Z (zoom level). These values are specified using wildcard code for X - \{x\}, for Y - \{y\}, for Z - \{z\}. Additionally you can specify subdomains (e.g. for subdomains a.tileopenstreetmap.org, b.tileopenstreetmap.org, c.tileopenstreetmap.org the address will look like this: \{a,b,c\}.tile.openstreetmap.org).

**Note:** NextGIS Mobile requests tiles from each URL (subdomain) in 2 streams. So from URL like \{a,b,c\}.tile.openstreetmap.org tiles will be downloaded in 6 streams.

3. You can also specify Tile layer type (XYZ (OSM) and TMS (OSGeo) standards are supported), TMS in-memory cache size (none, 1, 2 or 3 screens) and credentials (Login & Password) if authentication is required for accessing tiles.

**Note:** Only Basic access authentication\textsuperscript{24} is currently supported.

4. Tap “Create” to create new raster layer from that TMS service. The newly created layer will be shown up in the layers tree in Layers tree.

\textsuperscript{24} http://en.wikipedia.org/wiki/Basic_access_authentication
5.6.3 Caching of tile service data

You can work **Offline** with raster layers created from external geoservices. In order to do it you need to download tiles for your area of interest to your device before going into the field:

1. Make sure raster layer you need in the field is added to Map screen and is visible. Then open the map extent you want to download tiles for.

2. Open Layers tree panel (item 1 in Fig. 4.1). Then find raster layer in Layers tree and tap Layer contextual menu icon (item 5 in Fig. 4.2).

3. Tap “Download tiles“ button in Layer contextual menu as shown in Fig. 5.22 below.

4. A new dialogue will open as shown in Fig. 5.23. Select zoom levels you need and tap “Start” button.

**Note:** The lower selected zoom levels, the smaller number of tiles for an area of interest will have to be downloaded and the faster they will be downloaded. You can track downloading progress in Android Status Bar. Notifications for NextGIS Mobile app should be switched ON in System Settings.

**Warning:** If number of tiles to download for selected zoom levels is more than 6000 tiles for each zoom level, only first 6000 tiles for each zoom level will be downloaded. The rest will not be downloaded due to danger of memory overflow.
5.6. Creating raster layer from external geoservice
5.7 Geodata uploading and web-maps creation using geodata from your Web GIS

NextGIS Mobile supports uploading of geodata from Web GIS created at nextgis.com cloud service.

For geodata uploading sign in not as a guest, but with rights for data creation, in your Web GIS. You can learn more about geodata uploading in Raster layer\textsuperscript{25} and Vector layer\textsuperscript{26}.

5.7.1 Geodata addition from Web GIS

To add files/geodata from Web GIS to NextGIS:

1. Open Layers tree panel (item 1 in Fig. 4.1). Then tap on “Add geodata” button (item 4 in Fig. 4.2). The dialogue will open as shown in Fig. 5.24. Select “Add from Web GIS”.

![Fig. 5.24: Addition from Web GIS.](image)

2. In opened dialogue select “Add Web GIS” and tap “Add” button (see Fig. 5.25):

3. Then fill up your Web GIS domain’s name and password for Web GIS in the form for Web GIS adding and tap “Sign in” button (see Fig. 5.26):

4. After Web GIS adding select the account with your Web GIS domain’s name and tap “Add” button (see Fig. 5.27):

\textsuperscript{25} http://docs.nextgis.com/docs_ngcom/source/data_upload.html#ngcom-raster-layer

\textsuperscript{26} http://docs.nextgis.com/docs_ngcom/source/data_upload.html#ngcom-vector-layer
5.7. Geodata uploading and web-maps creation using geodata from your Web GIS
5. The dialog of layer selection for importing geodata from your Web GIS to NextGIS Mobile will open (see Fig. 5.28):

If Web GIS layer has a style, there is a possibility to choose not only vector data, but also raster data for importing. Vector data are downloading to the mobile device and can be used offline. Raster data can be used only online. A vector layer can be added/imported either as vector or as raster data. Tick off the type for the layer in the right side of the screen (see Fig. 5.29):

Tap the button in the upper right corner of the screen to create a new group of data in your Web GIS. Specify a name for the group and tap “OK”. In the case of the success you will see it in your Web GIS window (see Fig. 5.30):

6. After the layer selection for importing from your Web GIS to NextGIS Mobile, tap “Add” button. The importing process will begin. The newly created layer will be shown up in the layers tree in Layers tree.
5.7. Geodata uploading and web-maps creation using geodata from your Web GIS

Рис.5.28: The dialog of layer selection for importing geodata from your Web GIS.

Рис.5.29: Layer type selection.
5.7. Geodata uploading and web-maps creation using geodata from your Web GIS

Рис.5.30: Adding of a new group.
EDITING LAYERS

NextGIS Mobile allows you to edit vector layers added to the map. While editing, you can:

- add new features;
- delete features;
- edit features.

6.1 Switching to Edit mode

There are several ways to switch to Edit mode.

1. The first way is Main actions button (the big blue button in the right bottom corner of map screen). Pressing Main actions button opens a menu of most common actions (see Fig. 6.1).

You need to tap the pencil button (item 6 in Fig. 6.1) to switch to Edit mode. Then select a vector layer you want to edit in an opened dialog (see Fig. 6.2).

2. The second way to switch to Edit mode is to long-press the object on the Map. This will activate Edit mode for the layer which includes this object.

3. The third way is to open Layers tree panel (item 1 in Fig. 4.1) and tap on Layer contextual menu icon next to the vector layer name (item 5 in Fig. 4.2). This will open the contextual menu items (item 6 in Fig. 4.2). There you need to select “Edit”.

6.2 The Editing Toolbar

After switching to Edit mode using any of the methods described in Switching to Edit mode (c. 37) section Editing Toolbar is opened at the bottom of the map screen (see Fig. 6.3).

Note: This editing toolbar is common for all vector layers irrespective of the type of geometry they contain (point, line or polygon).
Рис.6.1: Common actions menu.
The numbers indicate: 1 - Zoom in; 2 - Zoom out; 3 - Scale ruler; 4 - Measure button; 5 - Add geometry by walk; 6 - Edit layers; 7 - Add current location; 8 - Close Common actions menu.

Рис.6.2: Select layer dialog.
6.3 Adding features

To create a new feature first select a layer you want to add this feature to. Then switch to Edit mode using any of the methods described in Switching to Edit mode (c. 37) section.

After Editing Toolbar is opened tap “Add new feature” button (item 2 in Fig. 6.3).

**Note:** Type of geometry of a new feature should correspond to the type of geometry of the layer you want to add this feature to (e.g. you can only add a new point to a point/multipoint vector layer, a new line - to a line/multiline vector layer, etc.).

**Note:** If you want to start adding new features from scratch first you have to create an empty layer as described in Creating new vector layer (c. 15) section.

6.3.1 Adding a point

1. To create a new point first select a point/multipoint vector layer you want to add this feature to. Then switch to Edit mode using any of the methods described in Switching to Edit mode (c. 37) section.

2. Tap “Add new feature” button in Editing Toolbar (item 2 in Fig. 6.3).

3. In a point layer a new point will appear in the center of the screen highlighted in red. You can move this point anywhere on the map simply by dragging the circular handle attached to it. The red crosshair marker indicates the center of Map screen (see Fig. 6.4).

4. For adding a point to a multipoint layer execute steps 1-2 and then tap “Add point” (item 6 in Fig. 6.5). After that you can set point’s location as described above in the step 3.

5. After a geometry of new point is added you may set its attributes by tapping on the “floppy” button (item 5 in Fig. 6.4 and Fig. 6.5). Pressing floppy icon will save a new point and open Attributes editing form (see Fig. 6.6).

6. When all the attributes are set tap “Apply changes” button (item 2 in Fig. 6.6) to save the attributes. If you tap “Back” button instead (item 1 in Fig. 6.6) the app will warn you of any unsaved changes. You can also attach photos to
Рис.6.4: Adding a point to Point layer.
The numbers indicate: 1 - Quit (without saving); 2 - Feature ID & Name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Move point to the center of Map screen; 7 - Move point to the current location.

Рис.6.5: Adding a point to Multipoint layer.
The numbers indicate: 1 - Quit (without saving); 2 - Feature ID & Name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Add point; 7 - Delete point; 8 - Move point to the center of Map screen; 9 - Move point to the current location.
6.3.2 Adding a line

1. To create a new line first select a linestring/multilinestring vector layer you want to add this feature to. Then switch to Edit mode using any of the methods described in Switching to Edit mode (c. 37) section.

2. Tap “Add new feature” button in Editing Toolbar (item 2 in Fig. 6.3).

3. In a linestring layer a new line will appear in the center of the screen, with one of its vertices highlighted in red (see Fig. 6.7).

You can move the vertices anywhere on the map simply by dragging the circular handle attached to the selected vertex. If you tap on the vertex in the middle of the line, two new vertices will be created automatically. This way you can add as many vertices as you need and shape the line geometry any way you like, including smooth curves.

4. For adding a line to a multilinestring layer execute steps 1-2 and then tap “Add line” (item 6 in Fig. 6.8). After that you can set vertices’ location as described above in the step 3.

5. After a geometry of new line is added you may set its attributes by tapping on the “floppy” button (item 5 in Fig. 6.7 and Fig. 6.8). Pressing floppy icon will save a new line and open Attributes editing form (see Fig. 6.6).
Рис. 6.7: Adding a line to Linestring layer.
The numbers indicate: 1 - Quit (without saving); 2 - Feature ID & name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Delete vertex; 7 - Move vertex to the center of Map screen; 8 - Move vertex to the current location; 9 - Append geometry by walk; 10 - Edit by touch.
Рис.6.8: Adding a line to Multilinestring layer.
The numbers indicate: 1 - Quit (without saving); 2 - Feature ID & name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Add line; 7 - Delete line; 8 - Delete vertex; 9 - Move vertex to the center of Map screen; 10 - Move vertex to the current location; 11 - Contextual menu with the rest of commands (Append geometry by walk, Append geometry by touch).
6. When all the attributes are set tap “Apply changes“ button (item 2 in Fig. 6.6) to save the attributes. If you tap “Back“ button instead (item 1 in Fig. 6.6) the app will warn you of any unsaved changes. You can also attach photos to each feature using “Add photo“ button in Attributes editing form (item 3 in Fig. 6.6).

6.3.3 Adding a polygon

1. To create a new polygon first select a polygon/multipolygon vector layer you want to add this feature to. Then switch to Edit mode using any of the methods described in *Switching to Edit mode* (c. 37) section.

2. Tap “Add new feature“ button in Editing Toolbar (item 2 in Fig. 6.3).

3. In a polygon layer a new polygon will appear in the center of the screen, with one of its vertices highlighted in red (see Fig. 6.9).

![Fig. 6.9: Adding a polygon to Polygon layer.](image)

The numbers indicate: 1 - Quit (without saving); 2 - Feature ID & name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Add hole; 7 - Delete hole; 8 - Delete vertex; 9 - Move vertex to the center of Map screen; 10 - Move vertex to the current location; 11 - Contextual menu with the rest of commands (Append geometry by walk, Append geometry by touch).

You can move the vertices anywhere on the map simply by dragging the circular handle attached to the selected vertex. If you tap on the vertex in the middle of the line, two new vertices will be created automatically. This way you can add as many vertices as you need and shape the polygon geometry any way you like, including smooth curves.

You can also create holes in polygons by tapping button “Add hole“ (item 6 in Fig. 6.9).
6.9 or item 8 in Fig. 6.10) and creating a hole geometry the same way you create polygon geometry.

**Note:** Hole geometry must be located INSIDE a polygon geometry otherwise the changes won’t be saved!

4. For adding a polygon to a multipolygon layer execute steps 1-2 and then tap “Add polygon” (item 6 in Fig. 6.10). After that you can set vertices’ location as described above in the step 3.

5. After a geometry of new polygon is added you may set its attributes by tapping on the “floppy” button (item 5 in Fig. 6.9 and Fig. 6.10). Pressing floppy icon will save a new line and open Attributes editing form (see Fig. 6.6).

6. When all the attributes are set tap “Apply changes” button (item 2 in Fig. 6.6) to save the attributes. If you tap “Back” button instead (item 1 in Fig. 6.6) the app will warn you of any unsaved changes. You can also attach photos to each feature using “Add photo” button in Attributes editing form (item 3 in Fig. 6.6).
6.4 Adding current location

To add current location to a vector layer press Main actions button (item 8 in Fig. 4.1), and then press a pushpin icon (item 7 in Fig. 6.1). In an opened dialog select a layer you’d like to add current location to (only point/multipoint geometry will be displayed) (see Fig. 6.11). If there is only one point/multipoint layer available, it will be selected automatically.

![Select layer dialog](image)

Рис.6.11: Select layer dialog.

Current location will be added to selected layer as a new point or a new multipoint consisting of 1 point.

You can then add attributes as described in Adding a point (c. 39) section.

**Note:** You can add current location to Point and Multipoint layers only!

6.5 Adding line or polygon by walk

To add line or polygon by walk to a vector layer press Main actions button, and then press a walking man icon (item 5 in Fig. 6.1). In an opened dialog select a layer you’d like to add a new feature to (only linestring/multilinestring and polygon/multipolygon layers will be displayed) (see Fig. 6.12).

Find more information about adding geometries in Record tracks to vector layer (c. 58) section.
6.6 Editing a geometry

To edit an existing layer first select that vector layer and switch to Edit mode using any of the 3 methods described in Switching to Edit mode (с. 37) section. The feature will turn its colour to **Blue**. Then tap on the pencil icon in Bottom toolbar (item 3 in Fig. 6.3). The feature will turn its colour to **Red** in edit mode.

### 6.6.1 Editing a point

To start editing a point first select the point/multipoint layer in the Layer tree and switch to Edit mode, then select a point by pressing on it. It will change its colour to blue. Then tap on the pencil icon in Bottom toolbar (item 3 in Fig. 6.3). The selected point feature will be highlighted in red and have an arrow pointing at it.

To change location of a selected point simply pull it or arrow pointing at it to a desired place. Also a point can be moved using buttons from Bottom toolbar - to the center of the screen shown as Red Crosshair marker (item 6 in Fig. 6.13) or to the current device location (see item 7 in Fig. 6.13).

You can cancel editing at any point of time, without saving changes, by close editing button. (see item 1 in Fig. 6.13). The system will warn you about this.
In the end you can have your geo features digitized as shown below. See Fig. 6.13.

![Editing point](image)

Рис.6.13: Editing point.

The numbers indicate: 1 - Close editing (without saving); 2 - Feature ID & name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Move point to the Red Crossover (Center); 7 - Move point to the current location.

When you edit a multipoint all points included in it change their colour to blue. The selected point will be highlighted in red and have an arrow pointing at it (see Fig. 6.13).

You can delete selected point (item 7 in Fig. 6.14), move it to a new location simply pulling it or arrow pointing at it to a desired place, to the center of the screen shown as Red Crosshair marker (item 8 in Fig. 6.14) or to the current device location (item 9 in Fig. 6.14). Also you can add a new point to the multipoint (item 6 in Fig. 6.14).

### 6.6.2 Editing a line

To start editing a line first select the linestring/multilinestring layer in the Layer tree and switch to Edit mode, then select a line by pressing on it. It will change its colour to blue. Then tap on the pencil icon in Bottom toolbar (item 3 in Fig. 6.3). The line will change its colour to red and will show all its vertices. Current vertex is highlighted in red and has an arrow pointing at it. The center of line segment
between vertices is also indicated. Pressing the center of line segment leads to two new vertex being added to the line.

Selected vertex can be moved simply by pulling it or arrow pointing at it to a desired place. Also a vertex can be moved using buttons from Bottom toolbar - to the center of the screen shown as Red Crosshair marker (item 7 in Fig. 6.15) or to the current device location (see item 8 in Fig. 6.15).

You can delete the unrequired vertex by highlighting it and tapping delete vertex (see item 6 in Fig. 6.15)

In this way you can even get a smooth curve as per the geographic shape.

In the end you can have your geofeatures digitized as shown below. See Fig. 6.15.

The numbers indicate: 1 - Quit (without saving); 2 - Feature ID & name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Delete vertex; 7 - Move vertex to the center of Map screen; 8 - Move vertex to the current location; 9 - Append geometry by walk; 10 - Edit by touch.

**Note:** If only one vertex remains in a line this line is deleted automatically.

When you edit a multiline all points included in it change their colour to blue. The selected point will be highlighted in red and have an arrow pointing at it (see Fig. 6.16)

You can delete selected point or line (item 7 and 8 in Fig. 6.16), move a point to a new location simply pulling it or arrow pointing at it to a desired place, to the center of the screen shown as Red Crosshair marker (item 9 in Fig. 6.16) or to the
6.6. Editing a geometry

The numbers indicate: 1 - Quit (without saving); 2 - Feature ID & name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Add line; 7 - Delete line; 8 - Delete vertex; 9 - Move vertex to the center of Map screen; 10 - Move vertex to the current location; 11 - Contextual menu with the rest of commands (Append geometry by walk, Append geometry by touch).
current device location (item 10 in Fig. 6.16). Also you can add a new line to the multiline (item 6 in Fig. 6.16).

6.6.3 Editing a polygon

To start editing a polygon first select the polygon/multipolygon layer in the Layer tree and switch to Edit mode, then select a polygon by pressing on it. It will change its colour to blue. Then tap on the pencil icon in Bottom toolbar (item 3 in Fig. 6.3). The polygon will change its colour to red and will show all its vertices. Current vertex is highlighted in red and has an arrow pointing at it. The center of line segment between vertices is also indicated. Pressing the center of line segment leads to two new vertex being added to the line.

New vertex can be moved or otherwise edited right after it has been added. Selected vertex can be moved simply by pulling it or arrow pointing at it to a desired place. Also a vertex can be moved using buttons from Bottom toolbar - to the center of the screen shown as Red Crosshair marker (item 7 in Fig. 6.17) or to the current device location (see item 8 in Fig. 6.17).

You can delete the unrequired vertex by highlighting it and tapping “Delete vertex” button (see item 6 in Fig. 6.17).

**Note:** If only two vertices remain in a polygon this polygon is deleted automatically.

When you edit a multipolygon all points included in it change their colour to blue. The selected point will be highlighted in red and have an arrow pointing at it (see Fig. 6.18).

You can delete selected point or polygon (item 7 and 10 in Fig. 6.18), move a point to a new location simply pulling it or arrow pointing at it to a desired place, to the center of the screen shown as Red Crosshair marker (item 11 in Fig. 6.18) or to the current device location (item 11 in Fig. 6.18). Also you can add a new polygon to the multipolygon (item 6 in Fig. 6.18) and add or delete a hole (item 8 or 9 in Fig. 6.18).

6.7 Editing attributes

To start editing attributes first select a layer you want to edit attributes in. Then switch to Edit mode using any of the methods described in *Switching to Edit mode* (c. 37) section.

After Editing Toolbar is opened tap “Attributes info” button (item 5 in Fig. 6.3). This will open Attributes Info panel as shown in Fig. 6.19 below.

**Note:** NextGIS Mobile shows the following attribute fields by default (see item 4 in Fig. 6.19):

- For Point/Multipoint layers: each point’s location (in Latitude/Longitude).
- For Line/Multiline layers: length of each line feature (in meters).
The numbers indicate: 1 - Quit (without saving); 2 - Feature ID & name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Add hole; 7 - Delete hole; 8 - Delete vertex; 9 - Move vertex to the center of Map screen; 10 - Move vertex to the current location; 11 - Contextual menu with the rest of commands (Append geometry by walk, Append geometry by touch).
Рис.6.18: Editing multipolygon.
The numbers indicate: 1 - Quit (without saving); 2 - Feature ID & name of the Layer; 3 - Undo changes; 4 - Redo changes; 5 - Set attributes; 6 - Add polygon; 7 - Delete polygon; 8 - Add hole; 9 - Delete hole; 10 - Delete vertex; 11 - Contextual menu with the rest of commands (Move vertex to the center of Map screen, Move vertex to the current location, Append geometry by walk, Append geometry by touch).
6.7.1 Editing attributes using standard form

To start editing attributes using standard form first tap on “Set attributes” button (see item 6 in Fig. 6.19).

This opens a standard Attributes editing form as shown in Fig. 6.6.

After all the attributes are set tap “Tick” icon in the top right corner (item 2 in Fig. 6.6) to save the edits.

**Note:** If you tap the back button in the top left corner (item 1 in Fig. 6.6) instead, the system will warn you about unsaved changes.

The Camera icon at the bottom of a standard Attributes editing form (item 3 in Fig. 6.6) allows to add to each feature image files (e.g. photos) from the local storage or take new photos.
6.7.2 Editing attributes using custom form

If the layer was created from a custom form (NGFP) (c. 20) the custom Attributes editing form will be used for editing. An example of such custom form is shown below in Fig. 6.20:

Рис.6.20: Custom Attributes editing form.
The numbers indicate: 1 - Back to previous screen; 2 - Apply changes; 3 - Settings; 4 - Text or Integer field; 5 - Dropdown list; 6 - Date & Datetime; 7 - Radio buttons.

Custom Attributes editing forms may contain the following entry fields:
- Text;
- Space;
- Text field;
- List; Tandem list;
- Checkbox;
- Radio button;
- Date Picker;
- Photo.

“Text” field is used to provide additional information about geometry feature.
“Space” field is used to increase intervals between fields.
“Text field” can be used to add text or integers, depending on the field type (see item 4 in Fig. 6.20).
“List” and “Tandem list” fields are used to store and select values included in custom lists, for example, “List” - region/republic/territory, “Tandem list” - district/area in region/republic/territory (see item 5 in Fig. 6.20).

“Checkbox” field allows to check or uncheck a value.

“Date picker” field allows to select date, time or both of them (see item 6 in Fig. 6.20).

“Radio button” field allows to select one element from a list of mutually exclusive options (see item 7 in Fig. 6.20).

“Photo” field allows to take a new photo or to add photos from the local storage.

After all the attributes are set tap “Tick” icon in the top right corner (item 2 in Fig. 6.20) to save the edits.

**Note:** If you tap the back button in the top left corner (item 1 in Fig. 6.20) instead, the system will warn you about unsaved changes.
NextGIS Mobile allows to record and display tracks. Recorded track points are saved to the internal database. Track points recorded within one session are combined and displayed on the map as a line.

**Note:** Make sure that Location mode is switched on in your Android device settings. Also check the configurations of “My Tracks” and “Location” settings in NextGIS Mobile Settings as shown in Fig. 4.9.

## 7.1 Recording a track

Tracks can be recorded in two ways.

### 7.1.1 Record tracks in GPX format

1. To start recording a track press “Start new track” button in the Contextual menu on the Main screen (item 5 in Fig. 4.1).

Track recording is performed in background mode. To indicate that the process is running a status icon of the walking man is displayed in Android Notification bar. For more information click on it and it will show the track status as shown in Fig. 7.1 below.

![Recording track status](image)

**Rис.7.1:** Recording track status.

The numbers indicate: 1 - The status icon; 2 - Name of track session; 3 - “Open recording” button; 4 - “Stop track recording” button.

During track recording you can see the geometry of the track on Map screen as shown below in Fig. 7.2
Recorded track is displayed on the map immediately even though recording is not completed. The status icon (walking man) is still visible in the notification bar. The green flag shows the starting point of the track whereas the location marker shows the current device location.

**Note:** Track points are grouped by days and sessions within a day. If track recording continues the next day track will be split up into two parts.

2. To stop track recording, tap “Stop” button either in notification bar (see item 4 in Fig. 7.1) or in Contextual menu (see item 5 in Fig. 4.1). The status icon will disappear from notification bar, the location marker will be replaced by the red flag indicating the end of the track, and the track line will change its colour as shown below in Fig. 7.3

3. You can now manage this track, including its export in GPX format. To learn how to export the tracks see *Exporting tracks in GPX* (c. 65).

### 7.1.2 Record tracks to vector layer

You can also add a feature to an existing line or polygon vector layer by tracking.

1. Tap on Main actions button (see item 8 in Fig. 4.1) and then “Add geometry by walk” button (see item 5 in Fig. 6.1). It will open list of all editable Linestring/Multilinestring and Polygon/Multipolygon vector layers in a separate dialogue as shown below in Fig. 7.4
7.1. Recording a track

Рис.7.3: Recorded track.

Рис.7.4: Select Layer dialogue.
2. Select the layer to which you want to add a new feature by walk. This layer will be opened in Edit mode as shown below in Fig. 7.5, and NextGIS Mobile will start recording a new geometry to the vector layer.

![Fig. 7.5: Vector layer editing by walk.](image)

The numbers indicate: 1 - Close editing (without saving); 2 - Status icon; 3 - Feature ID & name of the Layer; 4 - Save feature; 5 - “Edit by walk” mode status; 6 - Location settings; 7 - Start point; 8 - Current device location.

**Note:** You can also switch to “Edit by walk” mode by first switching to Edit mode using any of the methods described in *Switching to Edit mode* (c. 37) section, and then by tapping “Append geometry by walk” button (see item 9 in Fig. 6.7, item 11 in Fig. 6.8, item 11 in Fig. 6.9 and item 11 in Fig. 6.10).

If you’re not satisfied with the accuracy of the appended geometry, you can access NextGIS Mobile Location settings (see Fig. 4.9) directly from “Edit by walk” screen (see item 6 in above Fig. 7.5).

3. When recording is finished tap on the “floppy” button (see item 4 in Fig. 7.5).
   It will open the standard Attributes editing form, similar to Fig. 6.6, as shown below in Fig. 7.6.

4. The new feature is now added to the existing Linestring/Multilinestring or Polygon/Multipolygon vector layer.

**7.1. Recording a track**
7.2 Managing recorded tracks

To start managing recorded tracks first find “My Tracks” group in Layers tree panel. Then tap on contextual menu button as shown in Fig. 7.7 and select “List”. This will open a list of recorded tracks as shown in Fig. 7.8 below. Tracks’ points will be grouped by days and sessions within the day.

Select a track by ticking the corresponding checkbox, and buttons in Top toolbar will become active as shown in Fig. 7.9 below.

To hide a layer from Map screen tap on “Eye” button (item 6 in Fig. 7.9).

You can change the colour of the track tapping the “Colour palette” button (item 3 in Fig. 7.9).

When you tap to open contextual menu (see item 5 in Fig. 7.9), the following menu items will pop up as shown below in Fig. 7.10.

- You can Show or Hide the selected track in the map screen. The starting point is shown in Green marker & the end point is shown in Red marker.
- You can delete the track (permanently).
- You can select all the tracks and perform above actions for all of them at a once.
7.2. Managing recorded tracks

Рис.7.7: “My tracks” in Layers tree panel.

Рис.7.8: List of recorded tracks.
Рис. 7.9: Toolbar for selected track. The numbers indicate: 1 - Go back; 2 - Track ID; 3 - Colour palette; 4 - Export button; 5 - Contextual menu; 6 - Track visibility button.

Рис. 7.10: Tracks contextual menu.
8.1 Exporting data in GeoJSON

To export data from NextGIS Mobile vector layer open Layers tree panel (item 1 in Fig. 4.1). Then tap on the contextual menu icon next to the layer name (item 5 in Fig. 4.2). This will open the contextual menu items as shown in item 6 in Fig. 4.2. There you need to select “Share”.

Android standard Share dialogue window with a list of available Share options will open as shown in Fig. 8.1.

After you select a share option, data in the selected layer will be recorded in GeoJSON format (coordinate system Web Mercator, EPSG:3857) and exported via the selected application. The name of GeoJSON file will be the same as the name of the exported layer.
Some of the share options (availability is dependent on the apps installed on your device):

- You can send the file as an attachment via Gmail or different Email app.
- You can upload the file to Google Drive/Dropbox/other cloud service and then share it with your colleagues.
- You can send the file to another device via Bluetooth or SHAREit.
- You can save the file on a memory card.

**Warning:** In many Android versions to save a file on the device memory card you need a file manager app (for example, ES Explorer or similar).

### 8.2 Exporting attachments

Each feature in vector layer can have one or more photos attached to it. Photos are stored separately as image files and added to archive file with layer data during the export. For each feature a separate attachments folder is generated in the archive, the name of the folder corresponds to feature ID.

Example:

(4:10000002.jpg,10000000.jpg,10000001.jpg,10000003.jpg)

Explanation:

4 photos are attached to a feature. These 4 photos are stored in the folder which name is similar to the feature ID.

### 8.3 Exporting tracks in GPX

To start exporting tracks first find “My Tracks” group in Layers tree panel. Then tap on contextual menu button as shown in Fig. 7.7 and select “List”.

This will open a list of recorded tracks as shown in Fig. 7.8. If there are few tracks recorded in a day, tracks will be divided into sessions. If a track was recorded during few days, this track will be divided into parts corresonding to recording days.

Select a track you want to export by ticking the corresponding checkbox, and buttons in Top toolbar will become active as shown in Fig. 7.9

To export the track, tap on Share button (see item 4 in Fig. 7.9). It will open the same Share dialogue window as shown in Fig. 8.1 above.

After you select a share option, data in the selected track will be recorded in GPX format and exported via the selected application.
8.3. Exporting tracks in GPX

Рис.8.2: “My tracks” in Layers tree panel.
Map is a set of raster and vector layers. Layers tree panel is designed to display the content of a map and to control visibility and hierarchy of map layers.

To change the hierarchy of map layers long-press the layer which is to be moved up or down. Layers tree panel will switch to Edit mode. Keep pressing and move the selected layer to its new position.

For turning layer visibility on/off tap on Layer visibility button (item 3 in Fig. 4.2). Additional operations with layers are available from a separate layer contextual menu (item 5 in Fig. 4.2).

For example, contextual menu for a vector layer includes following items:

1. Zoom to extent  
2. Attributes  
3. Share  
4. Send to NextGIS  
5. Edit  
6. Delete  
7. Settings

**Note:** Contextual menu depends both on layer type and geodata source. Raster layers have different contextual menus than Vector layers. Raster layers created from tile cache have different contextual menus than raster layers created from external geoservices.

### 9.1 Vector layer settings

#### 9.1.1 Style settings

Open layer contextual menu and tap on “Settings”. Vector layer style settings will open as shown in Fig. 9.1 below.

Vector layer style settings depend on the selected Render type - Simple or Rule (item 4 in Fig. 9.1).
Fig. 9.1 shows Simple Render style settings. If you select this Render type, all the features in the layer will have the same shape, color, size, etc.

For example, for a point/multipoint layer you can select features shape by using “Type” menu (see item 6 in Fig. 9.1) using the following options:

- Point
- Circle
- Diamond
- Cross
- Triangle
- Box
- Edit circle
- Crossed box

You can also set point size (see item 5 in Fig. 9.1), fill and stroke color (see item 7 in Fig. 9.1) and stroke width (see item 8 in Fig. 9.1).

In linestring/multilinestring layers you can select line type (solid, dash or edge solid), as well as fill and stroke color and stroke width.
In polygon/multipolygon layers you can select stroke color and width. Also you can select to display polygons as filled or empty (the semi-opaque stroke color will be applied if “Filled” is selected).

For any vector layer you can also choose to show Labels for each feature on a map. To do this tick “Text” checkbox and either enter the label text yourself or select the attribute field which will be used to label features on a map (item 9 in Fig. 9.1).

**Rule-based rendering**

You can also use the advanced styling option for your vector layer; and set different shapes, colors, sizes, etc. for layer features based on their attribute values.

For advanced styling of vector layer select “Rule” in the Render. It will open different style settings as shown in Fig. 9.2 below.

![Rule-based render style settings](image)

**Рис.9.2: Vector layer style settings (rule-based render style).**

The numbers indicate: 1 - Render type; 2 - Field selection; 3 - “Create new rule” button; 4 - Previously created rules; 5 - “Delete rule” button.

To adjust rule-based style settings first select the attribute field - its values will be used to create rules (see item 2 in Fig. 9.2).

Then tap on “Create new rule” button (item 3 in Fig. 9.2). It will open a list of all the unique values from the attribute field you have selected earlier. Select the value and tap “OK” to open Style settings dialogue as shown below in Fig. 9.3.

Here you can select and apply the same style settings as described above in *Simple rendering* (c. 68) (rule-based style settings are also dependent on vector layer type). Select “OK” when finished.

9.1. *Vector layer settings*
In this way you can create rule-based render styles for every value in the selected attribute field.

**9.1.2 Fields settings**

You can select which attribute field will be used to provide Feature ID for Edit screens, etc. To do this tap on “FIELDS” tab (see item 3 in Fig. 9.1) and select one of the fields as shown in Fig. 9.4

**Warning:** The selected field will not be used for rendering features labels on the map. For label settings see *Style settings* (c. 67).

**9.1.3 General settings**

“GENERAL” settings tab shows such information about vector layer as its local path, layer name & zoom levels to show on the map (it is possible to display the layer within certain zoom levels only). See Fig. 9.5 below.

Using this tab you can change layer name and zoom levels to show.

**9.1.4 Cache settings**

Using “CACHE” settings tab you can execute “Rebuild cache” command to optimize the layer creation process with the ability to save and cancel changes.
Рис.9.4: “FIELDS” vector layer settings tab.

Рис.9.5: “GENERAL” vector layer settings tab.

9.1. Vector layer settings
9.2 Raster layer settings

Raster layer contextual menu includes the following items (see Fig. 9.6):

- Zoom to extent
- Delete
- Settings

![Raster layer contextual menu](image)

Note: Raster layer created from external geoservice will have the option “Download tiles” instead of “Zoom to extent”. See *Caching of tile service data* (c. 30) for details.

9.2.1 Style settings

Open layer contextual menu and tap on “Settings”. Raster layer style settings will open as shown in Fig. 9.7 below.

Here you can set the values for:

1. **Opacity.** The value of layer opacity determines how intensive it hides or displays the contents of the underlying layer. Raster layer with 1% opacity is almost transparent. Completely opaque raster layer has an opacity of 100%.

2. **Contrast.**

3. **Brightness.**
9.2. Raster layer settings

9.2.2 General settings

“GENERAL” settings tab shows such information about raster layer as its local path, layer name & zoom levels to show on the map (it is possible to display the layer within certain zoom levels only). See Fig. 9.8 below.

Using this tab you can change layer name and zoom levels to show.

9.2.3 Cache settings

Using “CACHE” settings tab you can set TMS in-memory cache size for a raster layer from these options:

• No cache
• 1 screen
• 2 screens (recommended)
• 3 screens

You can also clear in-memory cache for this layer from this settings tab.
Рис. 9.8: “GENERAL” raster layer settings tab.
10.1 New Web GIS creation

There are two ways to create a new Web GIS. The first way is the following:

1. Open Layers tree panel (item 1 in Fig. 4.1).
2. Then tap on “Add geodata” button (item 4 in Fig. 4.2).
3. Select “Add from Web GIS” (Fig. 10.1)
4. In opened dialogue select “Add Web GIS” (Fig. 10.2).
5. Then fill up your Web GIS domain’s name and password for Web GIS in the form for Web GIS adding and tap “Sign in“ button (Fig. 10.3).

The second way is the following:

1. Tap contextual menu icon (item 5 in Fig. 4.1).
2. Select “Settings“ (Fig. 10.4).
3. Select “Web GIS“ (Fig. 10.5).
4. In opened dialogue select “Add Web GIS“ (Fig. 10.6).
5. Then fill up your Web GIS domain’s name and password for Web GIS in the form for Web GIS adding and tap “Sign in“ button (Fig. 10.3).

10.2 Connection to Web GIS

To create a connection to an existing Web GIS account:

1. Open Layers tree panel (item 1 in Fig. 4.1).
2. Then tap on “Add geodata“ button (item 4 in Fig. 4.2).
3. Select “Add from Web GIS“ (Fig. 10.1)
4. In opened dialogue select Web GIS (Fig. 10.2).
5. The dialog of layer selection for importing geodata from your Web GIS to NextGIS Mobile will open. If you have only one Web GIS, the dialog of layer
10.2. Connection to Web GIS

Рис.10.3: Web GIS adding dialog.

Рис.10.4: Contextual menu.
10.2. Connection to Web GIS

Рис.10.5: Setting dialogue.

Рис.10.6: Web GIS dialogue.
selection for importing geodata from your Web GIS to NextGIS Mobile will open immediately after tapping “Add from Web GIS” button.

10.3 Connection to NextGIS Web

You can learn more about main features of NextGIS Web in Key features of NextGIS Web\(^\text{27}\).

If you want to keep your data on your own NextGIS Web server, tap “Add Web GIS” using either of the ways to create a new Web GIS (see above), follow the link at the bottom of the screen (see Fig. 10.7) and use your account.

![Add Web GIS](image)

Рис.10.7: Add Web GIS dialogue.

In opened dialogue fill up NextGIS Web URL, login and password in the form and tap “Sign in” button (see Fig. 10.8).

**Note:** Login and password for NextGIS Web adding should be filled up without spaces! Many gadgets add a space at the end of the text during autosubstitution or pasting the text from the clipboard to the login/password, and NextGIS Web identifies this as another login or password and cancel the connection.

10.4 Editing of Web GIS account

To edit Web GIS account:

\(^{27}\) [http://docs.nextgis.com/docs_ngweb/source/general.html#ngweb-keyfeatures](http://docs.nextgis.com/docs_ngweb/source/general.html#ngweb-keyfeatures)
1. Tap contextual menu icon (item 5 in Fig. 4.1).
2. Select “Settings” (Fig. 10.4).
3. Select “Web GIS” (Fig. 10.5).
4. Select Web GIS account (Fig. 10.6).
5. In opened window select “Edit account” (see Fig. 10.9).
6. Here you can edit the following fields (see Fig. 10.10):
   1. Login.
   2. Password.

10.5 Deleting of Web GIS account

You can delete Web GIS account in several ways. The **first way** is the following:

1. Tap contextual menu icon (item 5 in Fig. 4.1).
2. Select “Settings” (Fig. 10.4).
3. Select “Web GIS” (Fig. 10.5).
4. Select Web GIS account (Fig. 10.6).
5. In opened window select “Delete account” (see Fig. 10.11).
6. Delete selected Web GIS account.
10.5. Deleting of Web GIS account

Рис.10.9: Settings dialogue.

Рис.10.10: Editing of Web GIS account.
7. In the case of successful deleting, the window with Web GIS selection will be opened without deleted Web GIS account.

The second way to delete Web GIS account is the following:

1. Open OS settings of the gadget.
2. Select “Accounts” in settings (see Fig. 10.12).
3. Select the “NextGIS” account from the list (see Fig. 10.13).
4. In opened window select Web GIS account (see Fig. 10.14).
5. In opened “Sync” window tap contextual menu icon in the right upper corner of the screen and select “Remove account” (see Fig. 10.15).

### 10.6 Adding of a layer (vector/raster) from Web GIS

To add a layer (vector/raster) from Web GIS:

1. Open Layers tree panel (item 1 in Fig. 4.1).
2. Then tap on “Add geodata” button (item 4 in Fig. 4.2).
3. Select “Add from Web GIS” (Fig. 10.1)
4. In opened dialogue select Web GIS (Fig. 10.2). You can learn more about creating of Web GIS account in ngmobile_create_a_connection.
5. In opened window you can see the list of internal resources and layers (vector and raster) for the selected Web GIS account (see Fig. 10.16).
10.6. Adding of a layer (vector/raster) from Web GIS
10.6. Adding of a layer (vector/raster) from Web GIS

Рис.10.14: Web GIS account selecting in OS settings.

Рис.10.15: Web GIS account deleting through the OS settings.
6. Select a group of Web GIS resources and within it tick a layer (vector/raster) you want to add and tap “Add” (see Fig. 10.17).

**Note:** If you need to select several layers in different groups of Web GIS account, the tick of the layer selection will keep while you switching over the groups.

7. Layer’s processing dialogue includes options “Cancel” and “Hide” (see Fig. 10.18).

To stop Web GIS layer’s processing tap “Cancel” button. To avoid program’s interface blocking and to continue working with NextGIS Mobile tap “Hide” button. As a result Web GIS layers’s processing dialogue will be transfered to status panel (see Fig. 10.19).

**Note:** To stop the processing of Web GIS layer, which was transfered to status panel touch the screen on the layer’s processing panel with thumb and forfinger and move them in different directions sliding along the screen. The indicator of the Web GIS layer’s processing will be transfered to status panel and the “Stop” button will appear. Tap it to stop the processing of Web GIS layer.

After you execute all above mentioned selected Web GIS layers (vector/raster) will be added to a map and will be shown up in the layers tree.

10.6. Adding of a layer (vector/raster) from Web GIS
Рис.10.17: Selecting a layer within a Web GIS resources group.
Рис.10.18: Layers’s processing dialogue.

Рис.10.19: Status panel.

10.6. Adding of a layer (vector/raster) from Web GIS
10.7 Synchronization settings for Web GIS vector layer

Synchronization helps to interchange of geodata corrections quickly and to provide the identity of information interchanging between user’s PC and mobile gadget. To synchronize Web GIS vector layer:

1. Tap contextual menu icon (item 5 in Fig. 4.1).
2. Select “Settings” (Fig. 10.4).
3. Select “Web GIS” (Fig. 10.5).
4. Select Web GIS account (Fig. 10.6).
5. In will open a dialogue with options (see Fig. 10.20):
   - automatic synchronization;
   - synchronization interval (can be set to 5 minutes - 2 hours);
   - synchronization of the Web GIS layers.

Рис.10.20: Settings of Web GIS account.

After a Web GIS layer for synchronization is selected the icon of the synchronization beginning appears near the the icon of the selected layer and near the icon of that layer on the layers tree (see Fig. 10.21):
Рис.10.21: Layers tree.

10.7. Synchronization settings for Web GIS vector layer
11.1 Login to application

11.1.1 What should be the username and password for logging in to NGM?

To authorize in NGM, you must use an account (NextGIS ID). Here\textsuperscript{28} you can see how to get it (you only need mail). If you created, but forgot the password for NextGIS ID, then follow the link\textsuperscript{29}.

11.1.2 I log in to NGM as administrator and the application shows an error. What am I doing wrong?

To log in to NextGIS Mobile, you must use \textbf{an account (NextGIS ID)}. Administrator - Web GIS username. You cannot enter the application with this name.

\textsuperscript{28} https://docs.nextgis.ru/docs_ngcom/source/create.html#nextgis-id/
\textsuperscript{29} https://docs.nextgis.ru/docs_ngcom/source/faq_webgis.html#q-nextgis-id/
Android

Android is a mobile operating system developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as smartphones and tablets. Android has the largest installed base of all operating systems (OS) of any kind. Android has a growing selection of third-party applications, which can be acquired by users by downloading and installing the application’s APK (Android application package) file, or by downloading them using an Google Play Store that allows users to install, update, and remove applications from their devices.

Cloud

Cloud Computing Cloud computing is a type of Internet-based computing that provides shared computer processing resources and data to computers and other devices on demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services), which can be rapidly provisioned and released with minimal management effort. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers, that may be located far from the user—ranging in distance from across a city to across the world.

Coordinate System

Geographic Coordinate System A geographic coordinate system is a coordinate system that enables every location on Earth to be specified by a set of numbers, letters or symbols. The coordinates are often chosen such that one of the numbers represents a vertical position, and two or three of the numbers represent a horizontal position. A common choice of coordinates is latitude, longitude and elevation.

Geodata

Geodata Geodata is collection of geographic features & associated information about them, also known as spacial information.

GeoJSON

GeoJSON GeoJSON is an open standard format designed for representing simple geographical features, along with their non-spatial attributes, based on JavaScript Object Notation. The features include points, linestrings & polygons and multi-part collection of these types.
GIS

**Geographic Information System** A Geographic Information System is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographical data. In general, the term describes any information system that integrates, stores, edits, analyzes, shares, and displays geographic information. GIS applications are tools that allow users to create interactive queries (user-created searches), analyze spatial information, edit data in maps, and present the results of all these operations. GIS is a broad term that can refer to a number of different technologies, processes, and methods. It is attached to many operations and has many applications related to engineering, planning, management, transport/logistics, insurance, telecommunications, and business. For that reason, GIS and location intelligence applications can be the foundation for many location-enabled services that rely on analysis and visualization.

GLONASS

**Globalnaya Navigatsionnaya Sputnikovaya Sistema** “Global Navigation Satellite System”, is a space-based satellite navigation system operating in the radionavigation-satellite service and used by the Russian Aerospace Defence Forces. It provides an alternative to GPS and is the second alternative navigational system in operation with global coverage and of comparable precision. Manufacturers of GPS devices say that adding GLONASS made more satellites available to them, meaning positions can be fixed more quickly and accurately (location to within 2 meters).

GPS

**Global Positioning System** The Global Positioning System (GPS) provides geolocation and time information to a GPS receiver in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The GPS system operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS system provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.

Raster

**Raster** Raster image is a dot matrix data structure representing a generally rectangular grid of pixels or cells. The information is stored in a cell.

Tile

**Tile** These are square images sorted by the grid, displaying the map, often with size of 255 X 255 and in PNG format.

TMS

**Tile Map Service** Tile Map Service or TMS, is a specification for tiled web maps, developed by the Open Source Geospatial Foundation. The definition generally requires a URI structure which attempts to fulfill REST principles. The TMS protocol fills a gap between the very simple standard used by OpenStreetMap (XYZ) and the complexity of the Web Map Service
standard, providing simple urls to tiles while also supporting alternate spatial referencing system.

URL

**Uniform Resource Locator** A Uniform Resource Locator (URL), commonly informally termed a web address, is a reference to a web resource that specifies its location on a computer network, like Internet, and a mechanism for retrieving it.

Vector

**Vector** In a GIS, geographical features are often expressed as vectors, by considering those features as geometrical shapes. Different geographical features are expressed by different types of geometry as, Points, Lines & Polygons. The information about these features is stored in an attribute table.

XYZ

**Raster Tile Map** Slippy map (in OpenStreetMap terminology) or Tiled Web Map is a map displayed by seamlessly joining dozens of individually requested image files over the internet. It is currently the most popular way to display and navigate maps, replacing other methods such as WMS which typically display a single large image, with arrow buttons to navigate to nearby areas. X, Y & Z denotes the numbering scheme to serve the images. The images are commonly of the size 256 X 256 in PNG format.
GNU GENERAL PUBLIC LICENSE

Version 3, 29 June 2007

Copyright (C) 2007 Free Software Foundation, Inc. <http://fsf.org/>

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

A.1 Preamble

The GNU General Public License is a free, copyleft license for software and other kinds of works.

The licenses for most software and other practical works are designed to take away your freedom to share and change the works. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program—to make sure it remains free software for all its users. We, the Free Software Foundation, use the GNU General Public License for most of our software; it applies also to any other work released this way by its authors. You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.
For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

A.2 TERMS AND CONDITIONS

A.3 0. Definitions.

“This License” refers to version 3 of the GNU General Public License.

“Copyright” also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

“The Program” refers to any copyrightable work licensed under this License. Each licensee is addressed as “you”. “Licensees” and “recipients” may be individuals or organizations.

To “modify” a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a “modified version” of the earlier work or a work “based on” the earlier work.

A “covered work” means either the unmodified Program or a work based on the Program.

To “propagate” a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To “convey” a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.
An interactive user interface displays “Appropriate Legal Notices” to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.


The “source code” for a work means the preferred form of the work for making modifications to it. “Object code” means any non-source form of a work.

A “Standard Interface” means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The “System Libraries” of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A “Major Component”, in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The “Corresponding Source” for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work’s System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

A.5 2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output,
given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.


No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work’s users, your or third parties’ legal rights to forbid circumvention of technological measures.


You may convey verbatim copies of the Program’s source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

A.8 5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:
a) The work must carry prominent notices stating that you modified it, and giving a relevant date.

b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to “keep intact all notices”.

c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.

d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an “aggregate” if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation’s users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.


You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the
same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A “User Product” is either (1) a “consumer product”, which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, “normally used” refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

“Installation Information” for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no
special password or key for unpacking, reading or copying.

A.10 7. Additional Terms.

“Additional permissions” are terms that supplement the terms of this License by making exceptions from one or more of its conditions. Additional permissions that are applicable to the entire Program shall be treated as though they were included in this License, to the extent that they are valid under applicable law. If additional permissions apply only to part of the Program, that part may be used separately under those permissions, but the entire Program remains governed by this License without regard to the additional permissions.

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.) You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.

Notwithstanding any other provision of this License, for material you add to a covered work, you may (if authorized by the copyright holders of that material) supplement the terms of this License with terms:

a) Disclaiming warranty or limiting liability differently from the terms of sections 15 and 16 of this License; or

b) Requiring preservation of specified reasonable legal notices or author attributions in that material or in the Appropriate Legal Notices displayed by works containing it; or

c) Prohibiting misrepresentation of the origin of that material, or requiring that modified versions of such material be marked in reasonable ways as different from the original version; or

d) Limiting the use for publicity purposes of names of licensors or authors of the material; or

e) Declining to grant rights under trademark law for use of some trade names, trademarks, or service marks; or

f) Requiring indemnification of licensors and authors of that material by anyone who conveys the material (or modified versions of it) with contractual assumptions of liability to the recipient, for any liability that these contractual assumptions directly impose on those licensors and authors.

All other non-permissive additional terms are considered “further restrictions” within the meaning of section 10. If the Program as you received it, or any part of it, contains a notice stating that it is governed by this License along with a term that is a further restriction, you may remove that term. If a license document contains a further restriction but permits relicensing or conveying under this License, you may add to a covered work material governed by the terms of that license document, provided that the further restriction does not survive such relicensing or conveying.
If you add terms to a covered work in accord with this section, you must place, in
the relevant source files, a statement of the additional terms that apply to those
files, or a notice indicating where to find the applicable terms.

Additional terms, permissive or non-permissive, may be stated in the form of a
separately written license, or stated as exceptions; the above requirements apply
either way.

A.11 8. Termination.

You may not propagate or modify a covered work except as expressly provided
under this License. Any attempt otherwise to propagate or modify it is void, and
will automatically terminate your rights under this License (including any patent
licenses granted under the third paragraph of section 11).

However, if you cease all violation of this License, then your license from
a particular copyright holder is reinstated (a) provisionally, unless and until
the copyright holder explicitly and finally terminates your license, and (b)
permanently, if the copyright holder fails to notify you of the violation by some
reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated
permanently if the copyright holder notifies you of the violation by some
reasonable means, this is the first time you have received notice of violation of
this License (for any work) from that copyright holder, and you cure the violation
prior to 30 days after your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of
parties who have received copies or rights from you under this License. If your
rights have been terminated and not permanently reinstated, you do not qualify to
receive new licenses for the same material under section 10.


You are not required to accept this License in order to receive or run a copy
of the Program. Ancillary propagation of a covered work occurring solely as a
consequence of using peer-to-peer transmission to receive a copy likewise does
not require acceptance. However, nothing other than this License grants you
permission to propagate or modify any covered work. These actions infringe
copyright if you do not accept this License. Therefore, by modifying or propagating
a covered work, you indicate your acceptance of this License to do so.

A.13 10. Automatic Licensing of Downstream
Recipients.

Each time you convey a covered work, the recipient automatically receives a
license from the original licensors, to run, modify and propagate that work, subject
to this License. You are not responsible for enforcing compliance by third parties
with this License.
An “entity transaction” is a transaction transferring control of an organization, or substantially all assets of one, or subdividing an organization, or merging organizations. If propagation of a covered work results from an entity transaction, each party to that transaction who receives a copy of the work also receives whatever licenses to the work the party’s predecessor in interest had or could give under the previous paragraph, plus a right to possession of the Corresponding Source of the work from the predecessor in interest, if the predecessor has it or can get it with reasonable efforts.

You may not impose any further restrictions on the exercise of the rights granted or affirmed under this License. For example, you may not impose a license fee, royalty, or other charge for exercise of rights granted under this License, and you may not initiate litigation (including a cross-claim or counterclaim in a lawsuit) alleging that any patent claim is infringed by making, using, selling, offering for sale, or importing the Program or any portion of it.


A “contributor” is a copyright holder who authorizes use under this License of the Program or a work on which the Program is based. The work thus licensed is called the contributor’s “contributor version”.

A contributor’s “essential patent claims” are all patent claims owned or controlled by the contributor, whether already acquired or hereafter acquired, that would be infringed by some manner, permitted by this License, of making, using, or selling its contributor version, but do not include claims that would be infringed only as a consequence of further modification of the contributor version. For purposes of this definition, “control” includes the right to grant patent sublicenses in a manner consistent with the requirements of this License.

Each contributor grants you a non-exclusive, worldwide, royalty-free patent license under the contributor’s essential patent claims, to make, use, sell, offer for sale, import and otherwise run, modify and propagate the contents of its contributor version.

In the following three paragraphs, a “patent license” is any express agreement or commitment, however denominated, not to enforce a patent (such as an express permission to practice a patent or covenant not to sue for patent infringement). To “grant” such a patent license to a party means to make such an agreement or commitment not to enforce a patent against the party.

If you convey a covered work, knowingly relying on a patent license, and the Corresponding Source of the work is not available for anyone to copy, free of charge and under the terms of this License, through a publicly available network server or other readily accessible means, then you must either (1) cause the Corresponding Source to be so available, or (2) arrange to deprive yourself of the benefit of the patent license for this particular work, or (3) arrange, in a manner consistent with the requirements of this License, to extend the patent license to downstream recipients. “Knowingly relying” means you have actual knowledge that, but for the patent license, your conveying the covered work in a country, or your recipient’s use of the covered work in a country, would infringe one or more identifiable patents in that country that you have reason to believe are valid.
If, pursuant to or in connection with a single transaction or arrangement, you convey, or propagate by procuring conveyance of, a covered work, and grant a patent license to some of the parties receiving the covered work authorizing them to use, propagate, modify or convey a specific copy of the covered work, then the patent license you grant is automatically extended to all recipients of the covered work and works based on it.

A patent license is “discriminatory” if it does not include within the scope of its coverage, prohibits the exercise of, or is conditioned on the non-exercise of one or more of the rights that are specifically granted under this License. You may not convey a covered work if you are a party to an arrangement with a third party that is in the business of distributing software, under which you make payment to the third party based on the extent of your activity of conveying the work, and under which the third party grants, to any of the parties who would receive the covered work from you, a discriminatory patent license (a) in connection with copies of the covered work conveyed by you (or copies made from those copies), or (b) primarily for and in connection with specific products or compilations that contain the covered work, unless you entered into that arrangement, or that patent license was granted, prior to 28 March 2007.

Nothing in this License shall be construed as excluding or limiting any implied license or other defenses to infringement that may otherwise be available to you under applicable patent law.


If conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot convey a covered work so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not convey it at all. For example, if you agree to terms that oblige you to collect a royalty for further conveying from those to whom you convey the Program, the only way you could satisfy both those terms and this License would be to refrain entirely from conveying the Program.

A.16 13. Use with the GNU Affero General Public License.

Notwithstanding any other provision of this License, you have permission to link or combine any covered work with a work licensed under version 3 of the GNU Affero General Public License into a single combined work, and to convey the resulting work. The terms of this License will continue to apply to the part which is the covered work, but the special requirements of the GNU Affero General Public License, section 13, concerning interaction through a network will apply to the combination as such.
A.17 14. Revised Versions of this License.

The Free Software Foundation may publish revised and/or new versions of the GNU General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies that a certain numbered version of the GNU General Public License “or any later version” applies to it, you have the option of following the terms and conditions either of that numbered version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of the GNU General Public License, you may choose any version ever published by the Free Software Foundation.

If the Program specifies that a proxy can decide which future versions of the GNU General Public License can be used, that proxy’s public statement of acceptance of a version permanently authorizes you to choose that version for the Program.

Later license versions may give you additional or different permissions. However, no additional obligations are imposed on any author or copyright holder as a result of your choosing to follow a later version.

A.18 15. Disclaimer of Warranty.

THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

A.19 16. Limitation of Liability.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.
A.20 17. Interpretation of Sections 15 and 16.

If the disclaimer of warranty and limitation of liability provided above cannot be given local legal effect according to their terms, reviewing courts shall apply local law that most closely approximates an absolute waiver of all civil liability in connection with the Program, unless a warranty or assumption of liability accompanies a copy of the Program in return for a fee.

END OF TERMS AND CONDITIONS
INDEX

A
Android, 91

C
Cloud, 91
Cloud Computing, 91
Coordinate System, 91

G
Geodata, 91
Geographic Coordinate System, 91
Geographic Information System, 92
GeoJSON, 91
GIS, 92
Global Positioning System, 92
Globalnaya Navigatsionnaya Sputnikovaya Sistema, 92
GLONASS, 92
GPS, 92

R
Raster, 92
Raster Tile Map, 93

T
Tile, 92
Tile Map Service, 92
TMS, 92

U
Uniform Resource Locator, 93
URL, 93

V
Vector, 93

X
XYZ, 93