Connected Society
Mobile Coverage Maps
How-to Guide

March 2020

The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with almost 400 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces the industry-leading MWC events held annually in Barcelona, Los Angeles and Shanghai, as well as the Mobile 360 Series of regional conferences.

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Connected Society

The GSMA Connected Society programme works with the mobile industry and key stakeholders to increase access to and adoption of mobile internet, focusing on underserved population groups in developing markets.

For more information, please contact us:
Web: www.gsma.com/connectedsociety
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Introduction

This document contains a detailed description on how to use the GSMA Mobile Coverage Maps platform which is available at mobilecoveragemaps.com
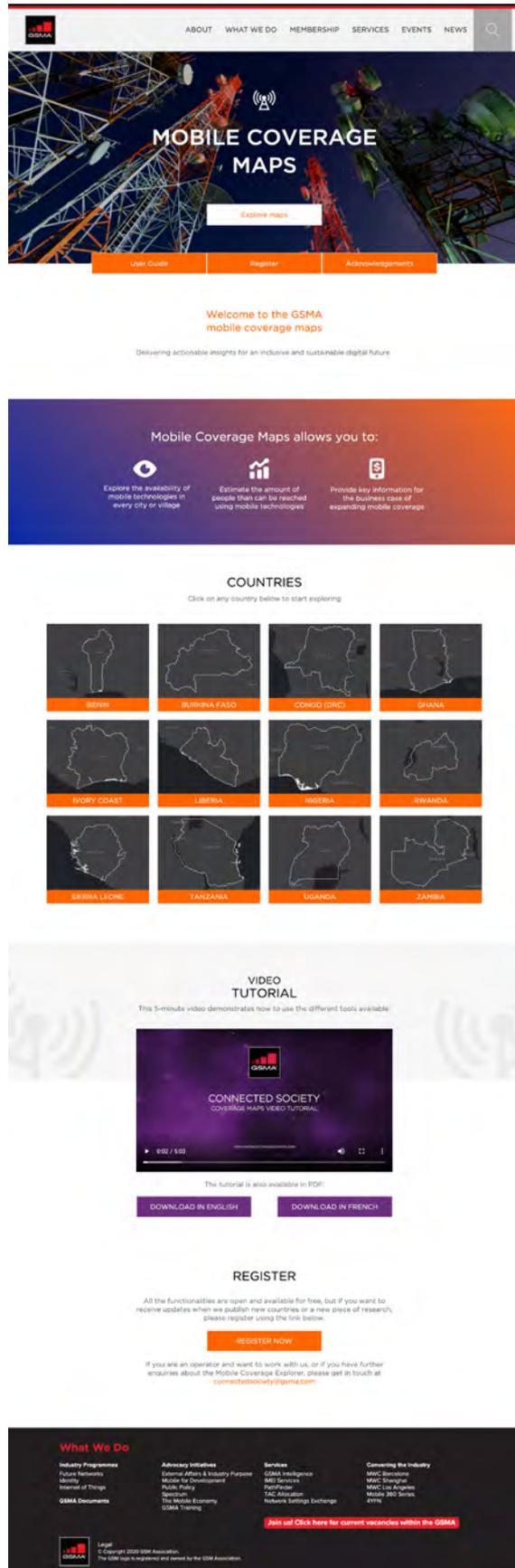
Home Page

The first page lists all the countries for which the platform has been developed to date, and provides access to this How-to Guide, a video tutorial (available in both English and French), as well as a description of the project and its supporting organisations.

Clicking on a country will open up the map for this country. To explore another location, go back to this page, either by accessing mobilecoveragemaps.com or by clicking on the 'back' arrow icon in the top banner, and select another country.

Home Page

Source: GSMA

Country map

When a country has been selected and opened, its map fills the browser window to let the user explore the map and discover the various tools and information panels displayed around the map.
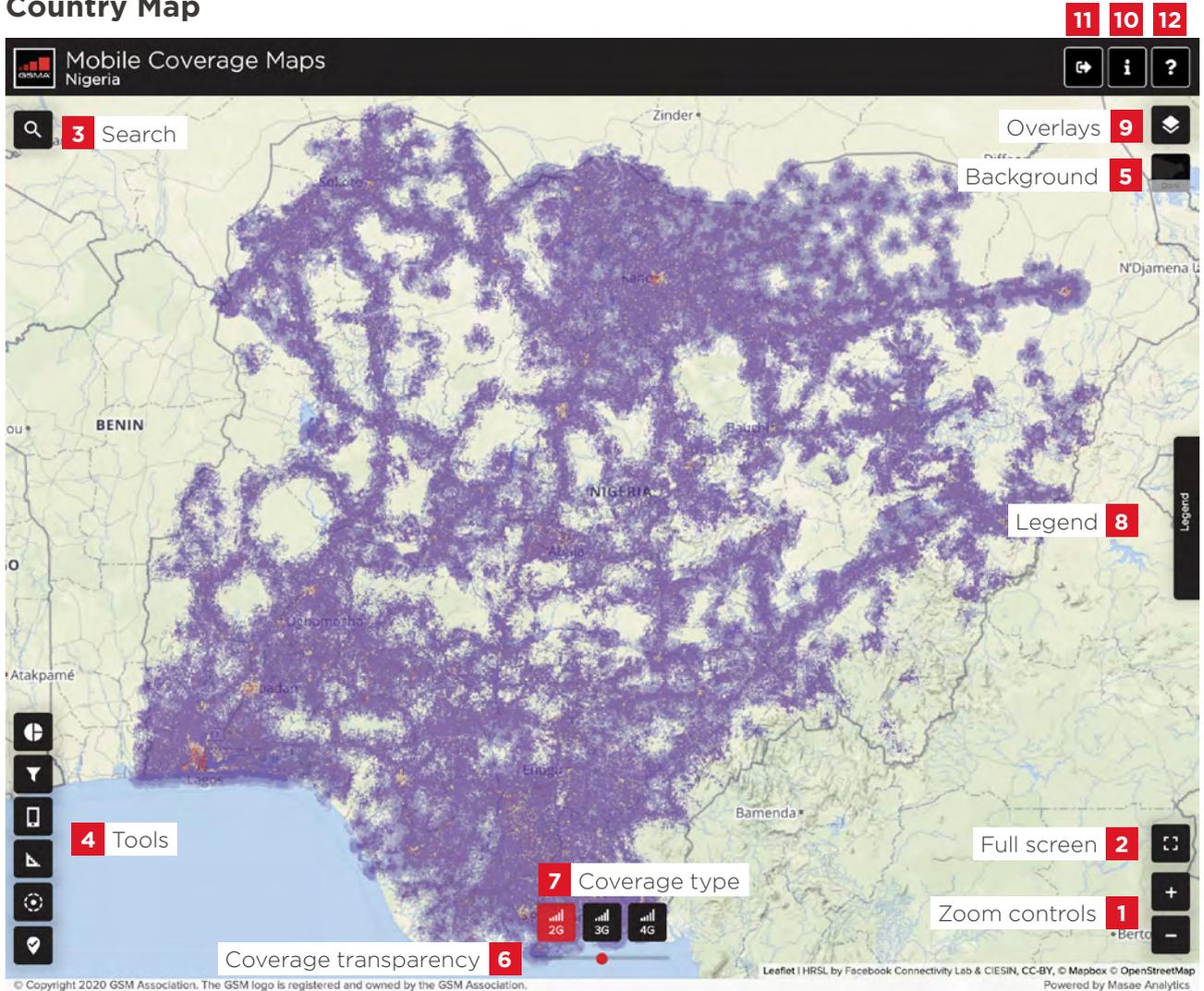
Map Navigation

The site uses the typical controls found on the majority of online maps:

- Using a computer mouse
  - Clicking the left mouse button and keeping it pressed down while moving the mouse will allow you to move the map around. This is known as 'map panning'.
  - If the mouse is equipped with a scroll wheel, scrolling the wheel will change the zoom level at which the map is displayed. This zoom in/out feature is also available through the +/- buttons located in the bottom right corner of the map.
  - Clicking on a map feature (e.g. a Point of Interest marker such as a school) will open an information panel, providing additional details on the selected feature.

- Using a touch interface
  - Touching the screen and sliding the finger in the required direction will allow you to move the map around ('map panning').
  - Using the 'pinch and zoom' gesture, i.e. widening or closing the gap between two fingers while touching the screen on the map area will enable you to zoom in and out.
  - Tapping on the feature marker will open the information panel on a feature.

Featured Controls

Figure 2

Country Map

Source: GSMA

1 **Zoom controls** can be used to zoom in and out on the map. In addition to these buttons, the zoom can also be controlled by using the scroll wheel on a computer mouse or with a pinch gesture on tactile devices.

2 **Full screen** toggles the map to a full-screen mode.

3 **Search** for places and/or coordinates. While typing, possible matches are suggested and can be selected. Once a place is selected, a pin will be shown on the map (which can be removed by clicking on it). The expected format for coordinates is a latitude/longitude pair (in that order) separated by a comma.

4 **Tools** are available to interact with the map and the data. See the next section for further detail.

5 **Background** can be changed depending on viewer preferences. Several map backgrounds can be chosen by hovering over the background button.

Figure 3

Available backgrounds

– **Terrain** is the default map background. It shows a limited amount of place names and various terrain related features such as water, relief and natural parks.

– **Dark** shows a black and grey version of the map. It can be used to enlarge the contrast between the background and the population density or signal coverage.

– **Light** is the inverse of the dark map and can be useful for print-friendly extracts.

– **Satellite** shows satellite images.

– **Roads** places emphasis on the visualisation of infrastructure such as roads, railways and buildings.

6 Coverage transparency is a slider that controls the transparency of the mobile coverage layer shown on the map in shades of purple. Moving the slider to the left will increase the transparency, while moving it to the right will decrease it.

7 Coverage type allows switching between different types of radio access technology (only one is displayed on the map at any given time). The list of available types depends on the selected country. Note: 2G is also referred to as GSM/EDGE, 3G as UMTS/HSxPA and 4G as LTE. The coverage being displayed is the merged coverage of all operators in the market.

8 Legend indicates the values corresponding to the colours in the population and coverage layer. For the population, red indicates high density, orange medium density and yellow a low-density area. The legend for the coverage is as follows:

– **Dark purple** good quality of service for outdoor and indoor voice calls and data.

– **Medium purple** good quality of service for outdoor voice calls and data, indoor service might be degraded.

– **Light purple** indoor service might be unavailable, outdoor service might be limited to SMS and USSD.

9 Overlays allows for disabling and enabling additional layers:

– **Population layer** is used to visualise the population density (on by default).

– **Historic coverage** (in some markets) allows a visual comparison of the coverage improvements by overlaying the most recent coverage available with the status one or several years before.

– **Additional layers** may be added in the future to show market-specific information.

10 Country profile, sources and disclaimer shows a panel on the right side of the screen containing attributions to sources used for the study as well as a disclaimer.

11 Home redirects to the country selection page.

12 Tutorial displays the interactive online tour at will.

Tools

The tools (#4 in Figure 2) can be used to gain in-depth insights about the map and the underlying data and are explained in more detail in this section.
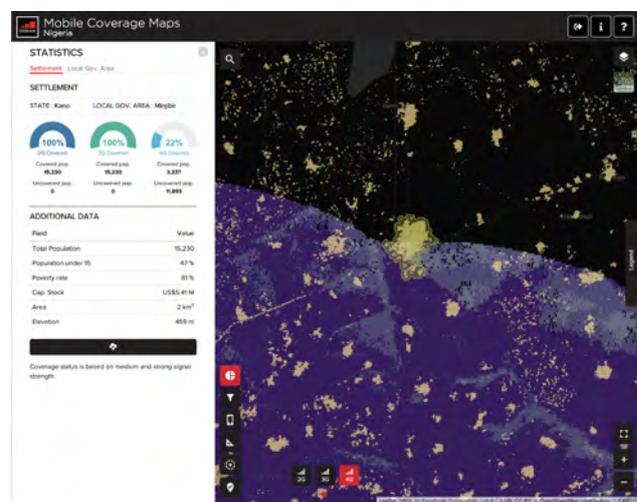
Statistics (on settlements and administrative areas)

Statistics is used to display statistics about a map feature such as an administrative boundary or settlement. Click once on the button to activate it. With the Statistics button on the left side of the screen active, click once on an area of interest on the map and a Statistics panel will appear on the left-hand side of the screen.

Settlements can be found by clicking on (large) groups of population coloured squares. If an underlying settlement is found, its outline will be coloured in green. An example of a selected settlement along with the corresponding statistics panel is shown in Figure 4.

Figure 4

Settlement statistics panel (left) along with the selected settlement in green (right)

Source: GSMA

Figure 5

Administrative boundary stats panel (left) along with the administrative boundary coloured in red (right)
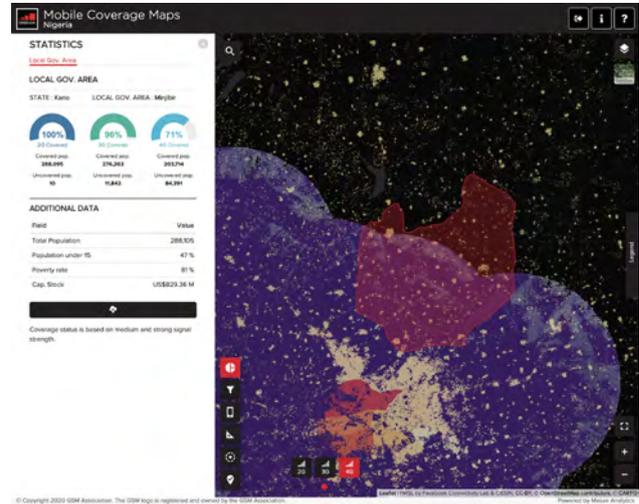
Administrative boundaries are visualised directly if the user clicks in an area where no settlement is found. Otherwise, the boundary can be revealed by clicking on the second tab in the information panel. This will disable the green outline of the settlement and show a red outline for the administrative boundary. An example of administrative boundary statistics is shown in Figure 5. On the right-hand side, the selected boundary is coloured in red.

The information displayed in the Statistics panel can also be downloaded as an Excel file by clicking on the download button just under the *Additional Data* section. The Excel file is made available inside a ZIP file.

At the top of the Statistics panel, tabs enable the user to switch between the settlement and administrative boundary views. Below the tabs are the names of the different administrative boundary levels (e.g. for Tanzania: region, district and ward), as well as coverage rings indicating the percentage of the population covered by technology for the selected feature.

Source: GSMA

Table 1

Additional data field descriptions

Field	Description
Total Population	The total population contained in the selected area
Population under 15	Percentage of the population in the area that is below 15 years old
Poverty rate	Percentage of population in the area having an income below the poverty line (income lower than $1.25 per day)
Cap. Stock (m$)	Total economic value of buildings in million US Dollars. This value is retrieved from the Global Assessment Report 2015[1] (GAR).
Area*	Total area of the settlement in square kilometres
Elevation*	Average elevation of the settlement

Source: GSMA   * = field only available for settlements

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1   https://www.preventionweb.net/english/hyogo/gar/2015/en/home/
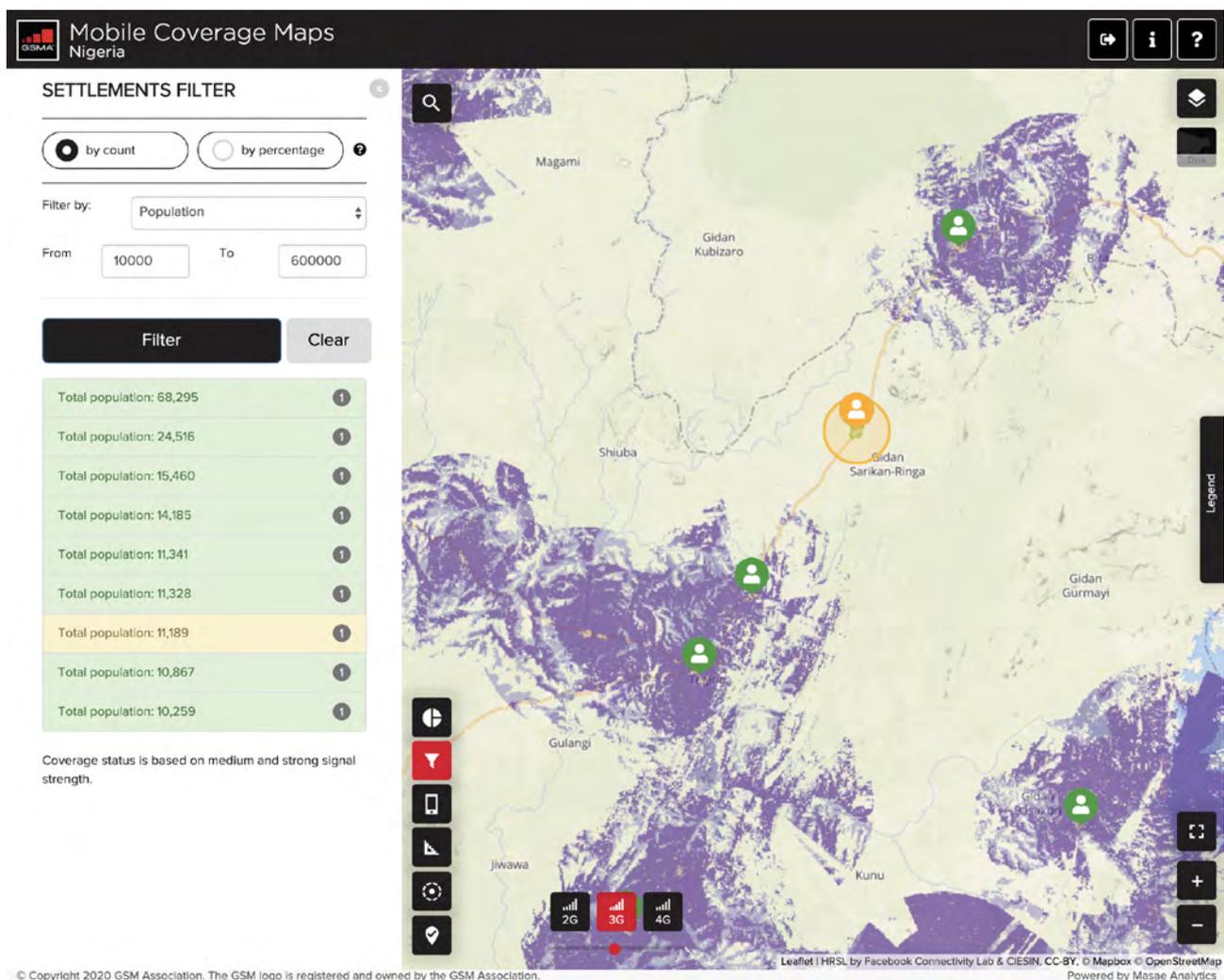
Settlements filter

The filter tool allows the user to identify specific settlements according to two filter criteria: *total population in settlement* and *population not covered by one radio access type (2G/3G/4G)*. The population not covered by one radio access type criteria can be expressed in percentages or absolute number of individuals. The *total population in settlement* criteria can only be expressed in absolute numbers. Depending on the chosen configuration, the from/to fields signify the higher and lower bounds of the query. For percentage queries, the expected values are between 0 and 100.

Note: the filter tool only returns settlements that are contained in the currently visible area of the map. Any settlements outside of it will not be returned. If needed, use the zoom out feature in the map navigation tools to retrieve additional settlements.

Once the criteria are all specified, a click on the filter button queries the database and returns all matching results. Feedback messages about the number of results found in the query are shown in the bottom right corner of the screen. The resulting settlements may be grouped under a single marker for visualisation purposes and are shown individually when zooming in or clicking on the green markers.

Figure 6

Settlements filter panel
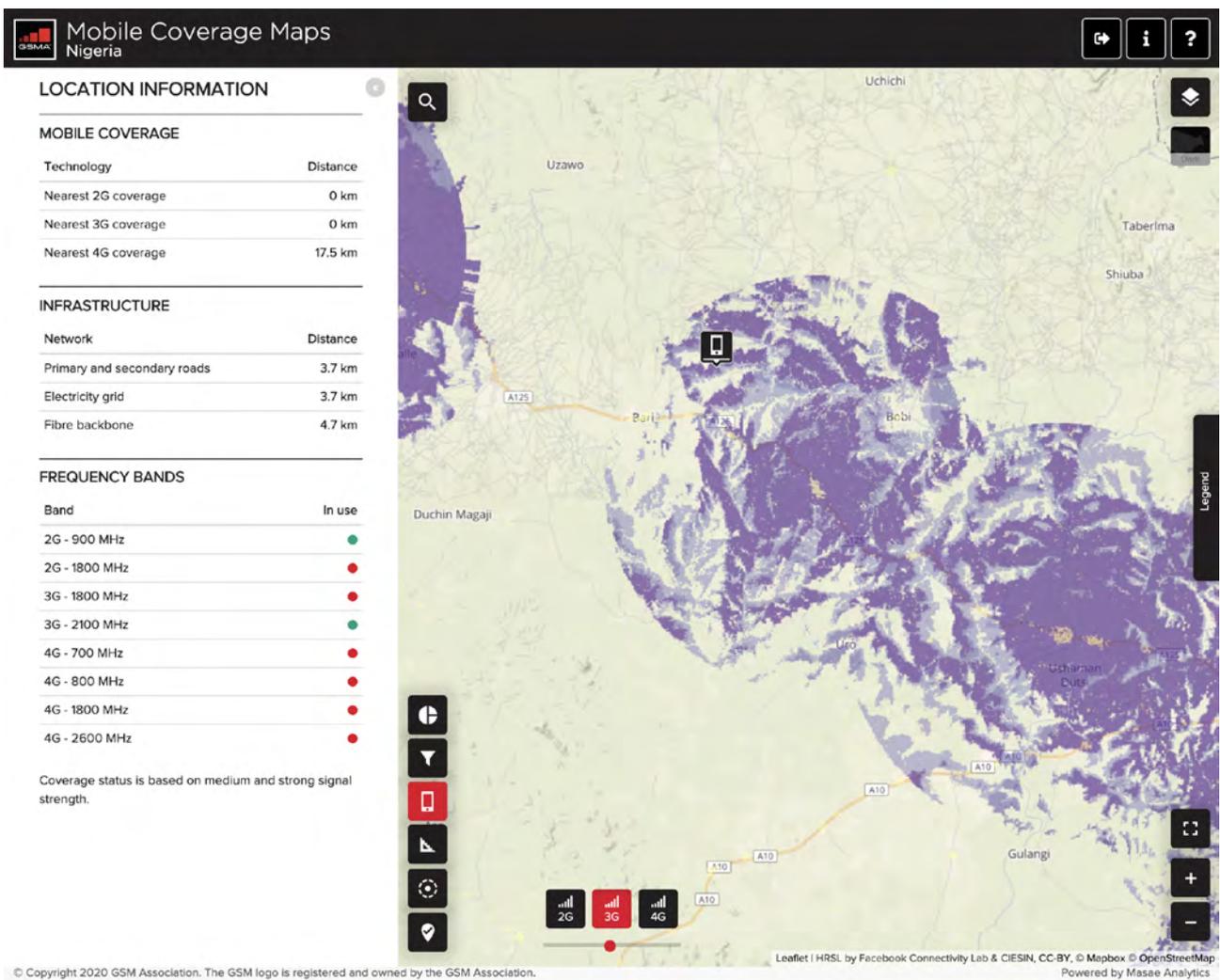
Source: GSMA

Location information

To use this tool, select it first on the left-hand side of the screen and click anywhere on the map to reveal the side panel containing the results. This tool provides several metrics related to the coordinates selected by the user:

- Shortest distance ("as the crow flies") to the nearest coverage. Three distances are computed: one for each radio network technology (2G/3G/4G),

- Distance to some infrastructure networks: primary and secondary roads, electricity grid and fibre backbone (country dependent),

- List of radio telephony frequency bands in use at this location

Figure 7

Location information panel

Source: GSMA

Map measure

The measure tool is used to measure a distance on the map. Click on the *Map measure* button to start measuring. The first click on the map will set a starting point, after which each subsequent click adds a line segment to the measured path. The cumulative distance and the segment length are both displayed next to each line segment.
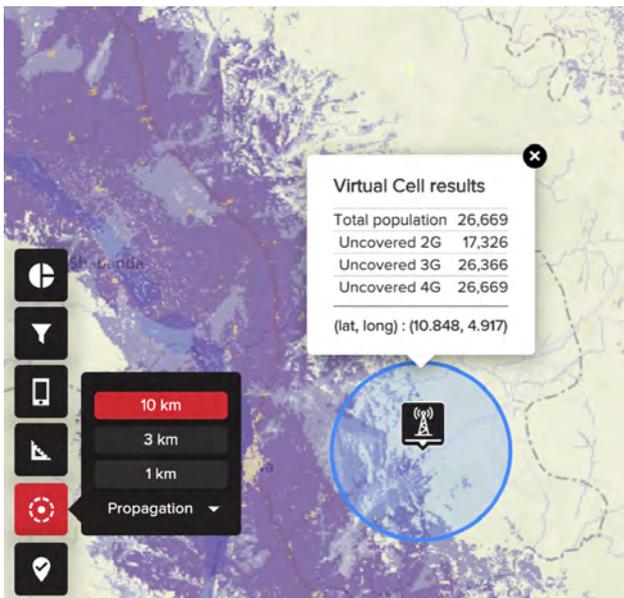
Virtual Cell (V-Cell)

The virtual cell is used to give an estimate of the total population inside a given area. By default, the radius of the virtual cell is set to 10 kilometres but can be decreased to 3 kilometres or 1 kilometre by clicking

on the appropriate button that appears next to the tool bar. The V-Cell can be dragged around, and the population living inside the V-Cell circle is recomputed when the V-Cell is released, as well as the population not covered by each radio network technology (2G/3G/4G).

An expert mode is also available by activating the *Propagation* option. This brings a panel where transmitter power, height above ground and frequency band can be set before launching a radio propagation prediction. This option is notably slower than the simpler circular V-Cell version, so it is recommended to start using the circular version to identify areas of interest, and switch to the more advanced version to finalise the analysis.
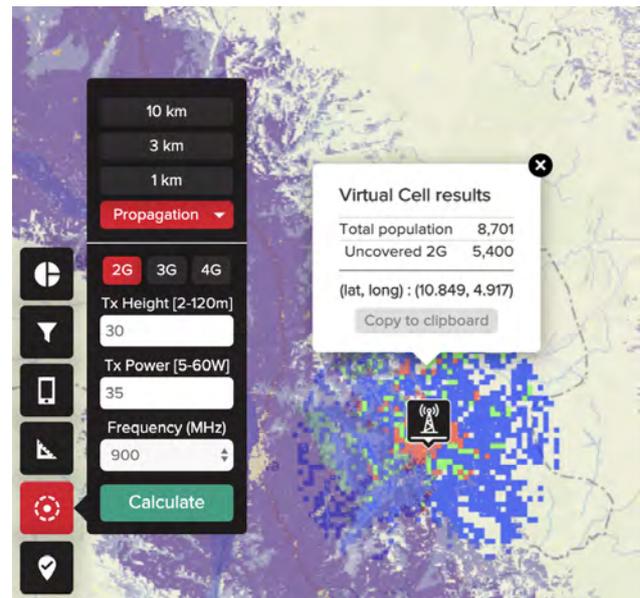
Figure 8

Virtual cell example, circular mode

Source: GSMA

Figure 9

Virtual cell example, propagation mode

Source: GSMA

POIs (Points of Interest)

POIs are points that can be shown on the map. Depending on the availability of data for each country, a POI can be one of four types: airports, refugee camps, health sites and educational facilities. Upon clicking on a point of interest, a side panel is shown on the left with the following information:
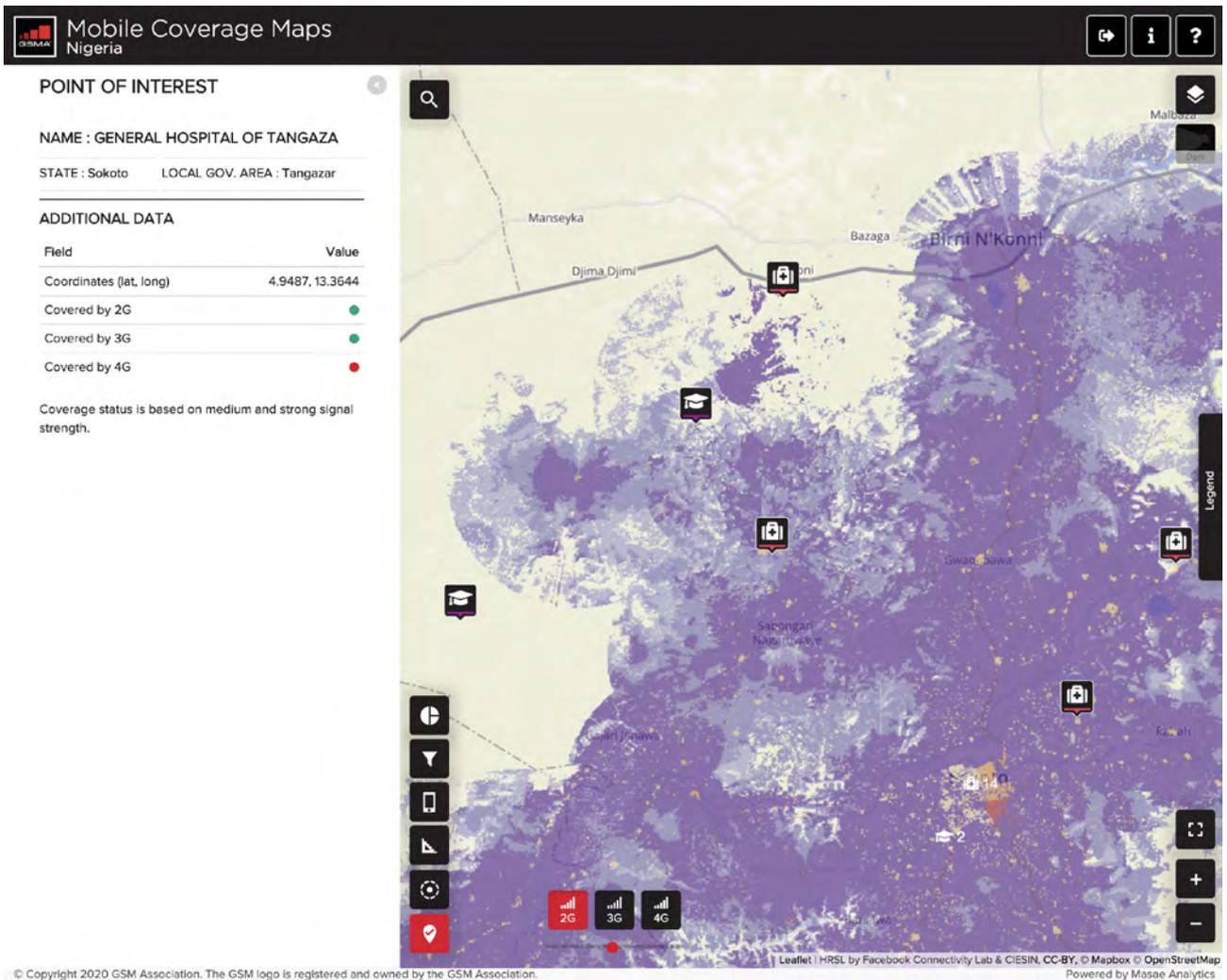
- Name

- Administrative region names

- Coordinates

- Coverage status by radio access technology

Depending on the active zoom level and how close the POIs are, they may be clustered together as long as they belong to the same category. A cluster is represented by a marker using the same symbol as the facility type along with the number of points contained in the cluster. Clicking on a cluster marker will zoom in to that location and de-cluster either into points, smaller clusters or a combination of both.

Figure 10

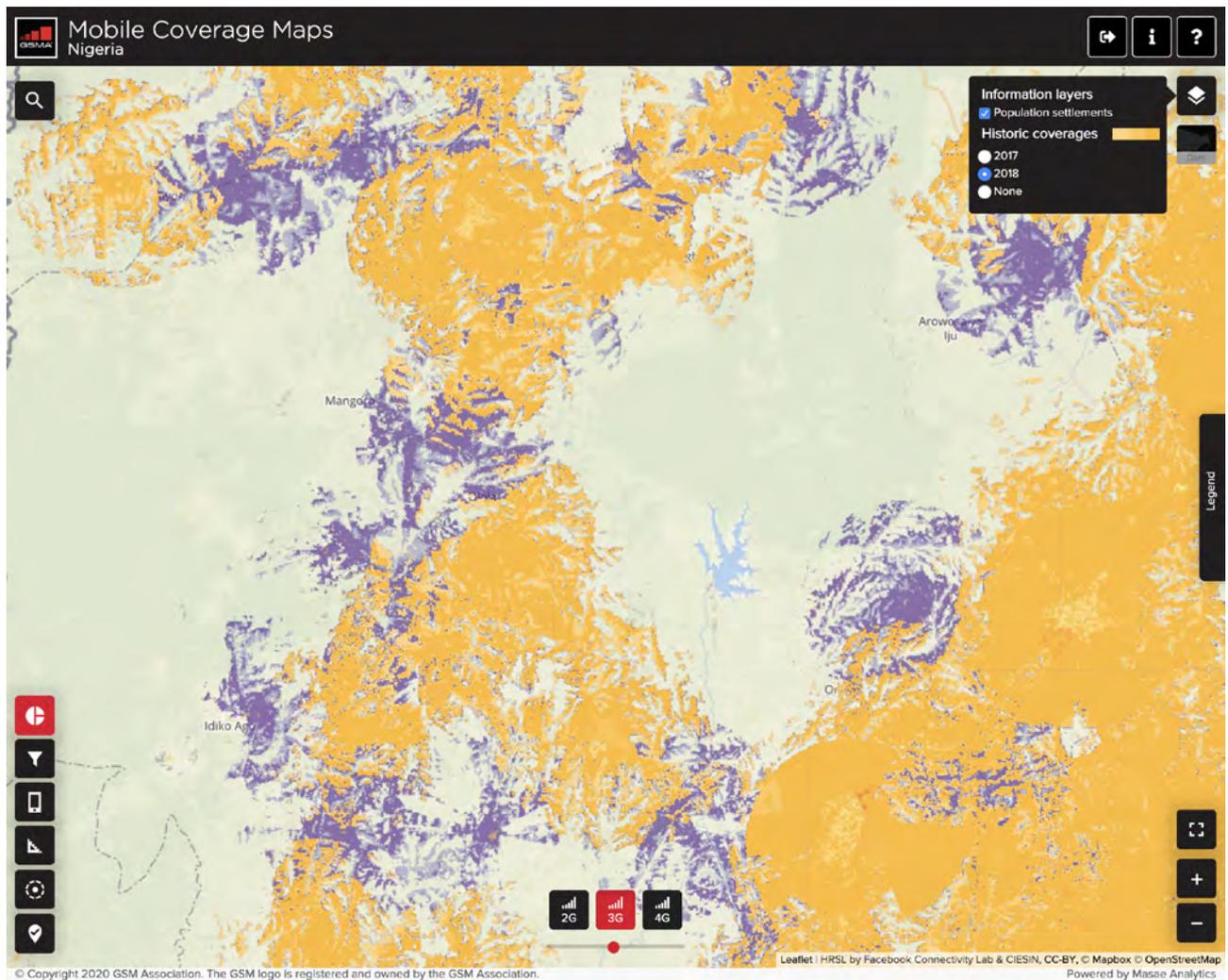# Points of interest and clusters

Source: GSMA

Historic coverage

In some markets, mobile coverage has been processed for several years and is thus available for comparison. The historic coverage availability as well as the years for which this historic coverage is available, can be found in the layers drop-down menu in the top-right corner of the map, as shown in the image below. The coverage type control at the bottom of the map switches the current and historical coverages together, and the drop-down menu gives the possibility to compare current coverage with another year, or switch back to current-only mode. Please note that all the information displayed in the panels using the map tools are only relevant to the current coverage, not the historic one.

Figure 11

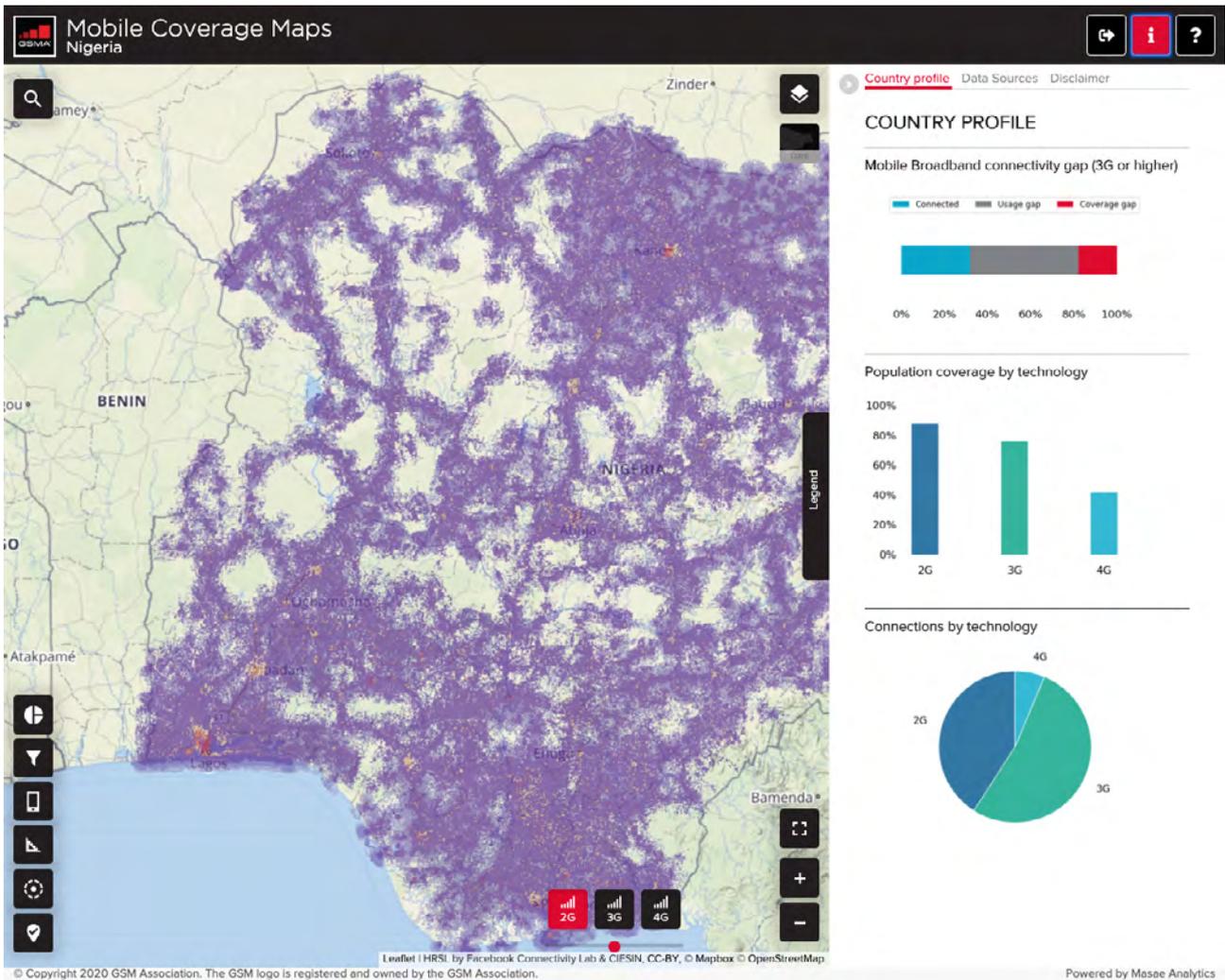## Historic coverage example

Source: GSMA

Country profile

The mobile broadband connectivity gap, as well as population coverage by radio access technology can be displayed at the national level using the information button found in the top banner. These charts are periodically updated to reflect the latest information made available by the GSMA Intelligence team.

Figure 12

Country profile example

Source: GSMA

Bookmarking / sharing specific locations

Any map view can be shared and sent to other potential users by either copying the web link displayed in the browser address field, or using the 'share link via email' feature of the browser.

Locations may also be remembered using the browser bookmarking functionality.

Links bookmarked or shared this way will directly position the map in the appropriate country, at the selected coordinates, using the same zoom level.

gsma.com/mobilefordevelopment/
connected-society/

To access the GSMA Connected Society programme's Mobile Coverage Maps platform, please visit www.mobilecoveragemaps.com