

المركز الوطني  
للإحصاء  
والمعلومات  
سلطنة عمان



NATIONAL CENTRE  
FOR STATISTICS  
& INFORMATION

SULTANATE OF OMAN

# Oman's Experience in Utilizing Mobile Positioning Data for Official Statistics

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# The Legal Basis for the Project

- **A Royal Decree issued in 2014** to regulate the work of the Centre.
  - Granting broad powers to the Centre in collecting and storing official statistics produced by the Centre and other government and non-government agencies
- **A Royal Decree issued in 2019** regarding the Statistics and Information Law:
  - Article 19 In order to achieve its objectives, the Center may request whatever data, information and administrative records it deems necessary from individuals, governmental and non-governmental agencies, without fees.
- **Article 32** punishes every non-governmental agency that refuses to provide the data and information required in accordance with the provisions of this law that are required by those in charge of official statistical activities.
- **Memoranda of understanding with telecom companies.**



# Introduction about the Telco

- The Telecommunications Regulatory Authority is the regulator of telecommunications
- Two companies provide telecom service with equal market share of 50% each
- Telecommunications Law in 2002
- Article 8, Clause 10
- Competences of the Authority: laying down controls that ensure the protection of data related to users and ensuring its confidentiality and privacy.

## 29- عدد الاشتراكات لخدمات الاتصالات حسب النوع 29 - No. Of Telecom Subscription Services By Type

Item	نسبة التغير Changes % فبراير / فبراير Feb / Feb (21/20)	2021		2020	الجملة حتى نهاية ديسمبر 2020
		فبراير	يناير	ديسمبر	Total Until End of Dec
		Feb	Jan	Dec	
No.					عدد.
B- Mobile Phone :-					
1- Post paid mobile	34.0	1,068,535	1,042,652	1,020,355	1,020,355
2- Pre paid mobile	-8.3	5,108,996	5,222,992	5,256,180	5,256,180
-Operators	-10.7	4,043,996	4,154,829	4,177,070	4,177,070
-Resellers	2.3	1,065,000	1,068,163	1,079,110	1,079,110
Total Mobile Subscriptions (1+2)	-3.0	6,177,531	6,265,644	6,276,535	6,276,535

Monthly Statistical Bulletin, March 2021, NCSI

# Project Objectives

- Investigate the possibilities of use of the MPD in Oman
- Improve the knowledge of society by implementing new data sources for statistics, monitoring, analysis and decision making
- Make the necessary preparations, tests and assessment for full-scale MPD based statistics implementation
- Create a proof-of-concept for the feasibility of MPD
- Showcase that MPD can improve some existing issues with traditional statistical collection methods
- Promote MPD based statistics on Omani example all over the World

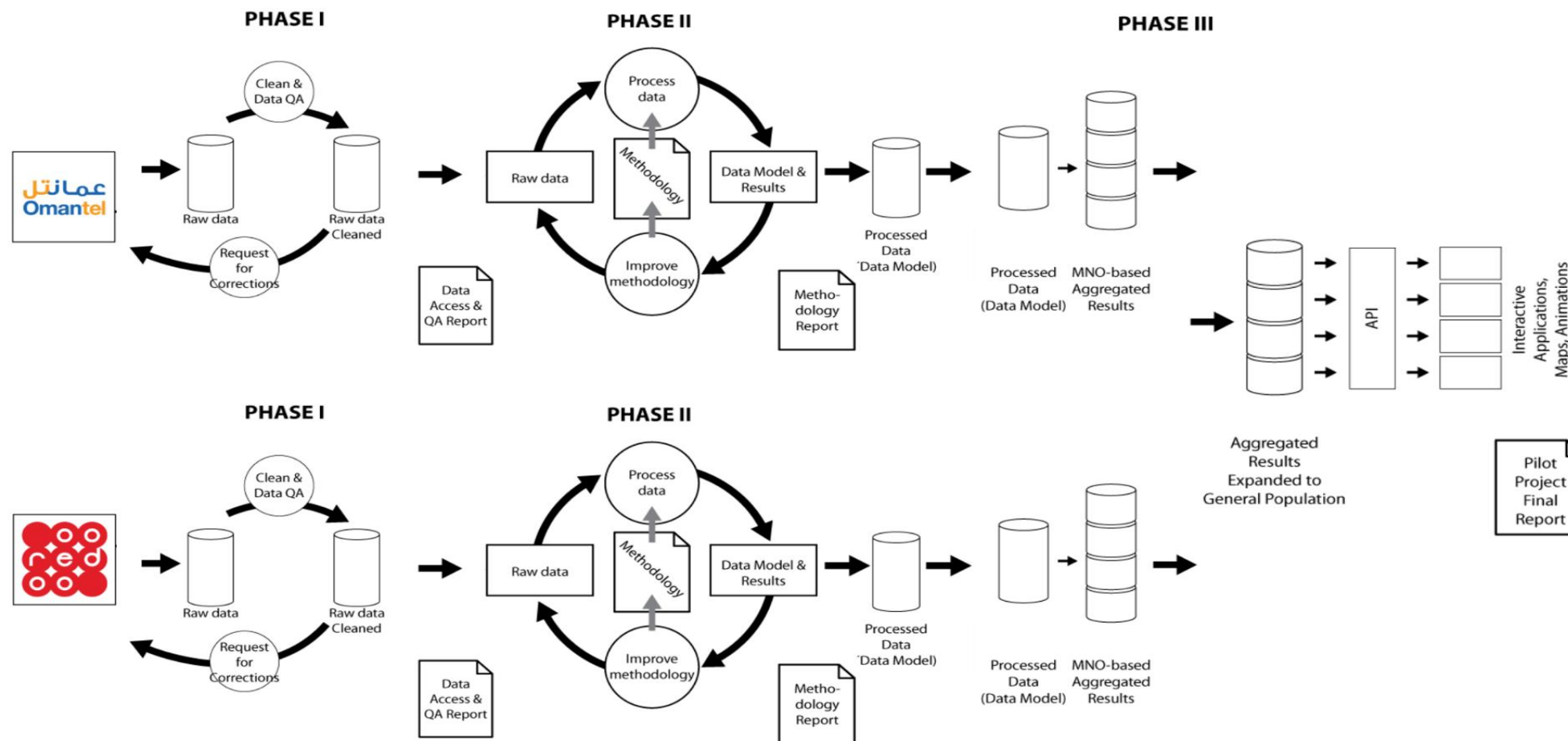
# Return of Investment

- Faster processing and production of statistical indicators
- **Supplementary and new indicators, and breakdowns which were previously unavailable**
- Improved temporal and spatial coverage and accuracy of the data
- No burden on the respondents
- **Applicability in a wide range of domains**
- **Cost-efficiency compared to the existing methods for same magnitude**

# The Project - Deliverables

- **Dissemination materials (D6):**
  - 10 different animations for presentation of specific phenomena based on the mobile data. The specific animations, types and focuses will be agreed in the beginning of Phase III. An example of one animation is: everyday commuting patterns of a week period for Oman (D6.1);
  - 15 different maps, graphs (possible combinations) and infographics to present specific phenomena or the general description of the mobile data usage in production of statistics (D6.2);
  - A PowerPoint presentation slides of 30 slides for dissemination concerning the results of the pilot project including abovementioned dissemination materials (D6.3).
  - Dissemination web-page explaining the project objectives and presenting the list of outcomes for viewing, downloading.
  - The web-page will be styled after NCSI portal and can be integrated to NCSI main portal (D6.4)
- **Centralized Database**
- **API for the statistical indicators supporting (D7):**
  - JavaScript Object Notation (JSON) standard format for applications;
  - Extensible Markup Language (XML) following SDMX-ML standard format;

# Data Flow



# The Statistical Indicators

As a result of the pilot project, statistics have been generated for country, governorate and wilayat levels (LAU 0, 1, 2, grid) for five domains of statistics for the period of January-June 2020:

## Population

### Anchor points

- Number of homes
- Number of work-places
- Number of second homes

## Temporary population and mobility

### De facto population

### Commuting

- OD matrices between home-work
- Classification of the visitor (local resident, worker, regular visitor, foreign / domestic tourists, transit)
- Temporal aggregation (day-time, night-time, day)

## Tourism

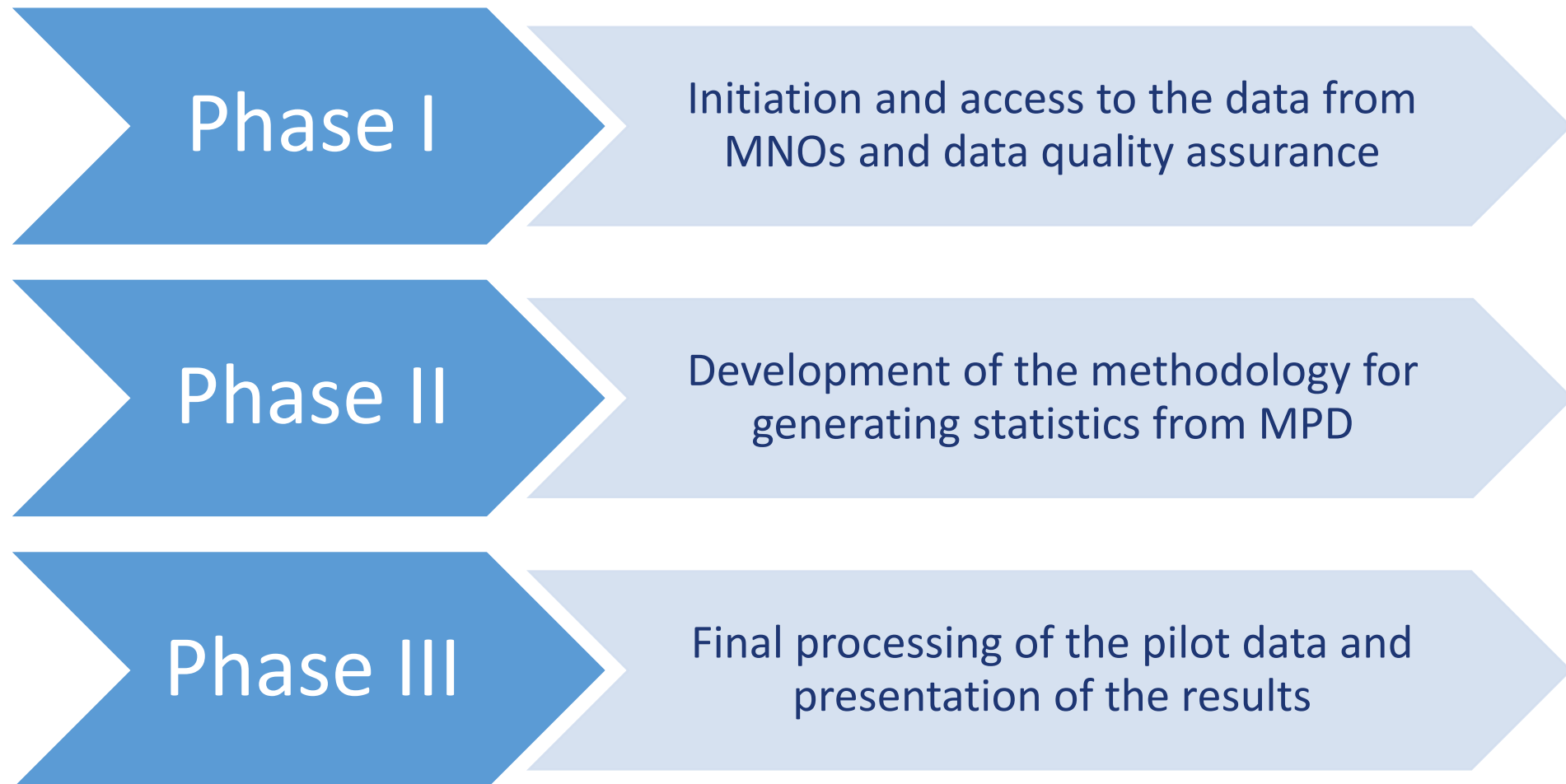
### Inbound tourism

### Domestic tourism

- Temporal aggregation (day, week, month)
- Spatial aggregation (national, governorates, provinces, grid)
- By country of origin/COR
- By type of stay (overnight, same-day)
- By duration of stay
- By destination type (main, secondary, transit)
- Number of visits
- Number of unique visitors
- Number of arrived/present/departed visitors
- Number of nights spent
- Average duration of visits (in hours)



# Project Phases



## Phase 1

# Initiation and access to the data from MNOs and data quality assurance

# Phase 1

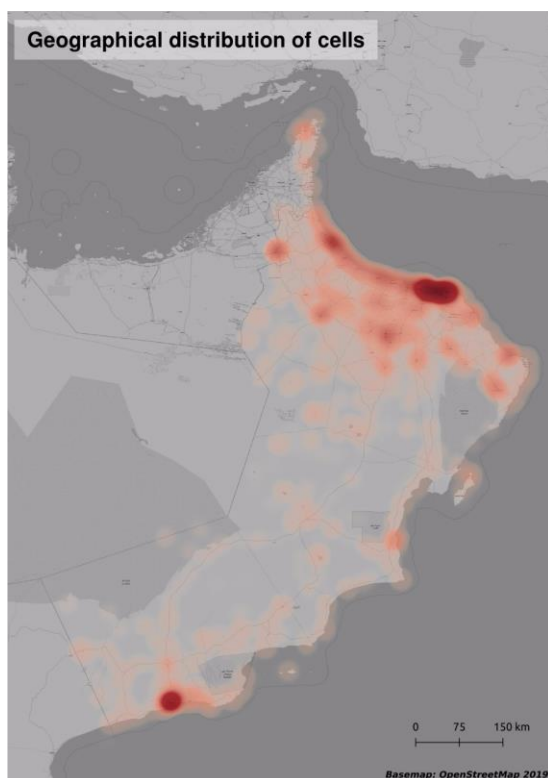
- Consultations with TRA
- Consultations with MNOs
- Validating samples before data extraction
- Preparing the data

# Phase 1

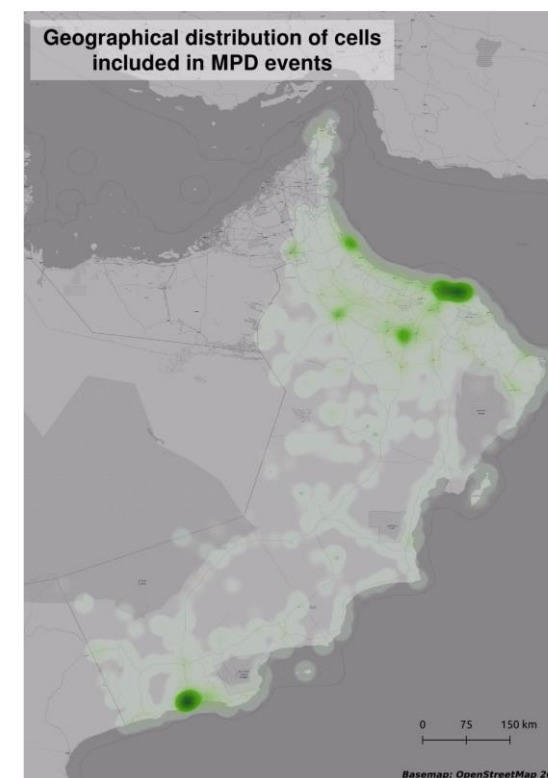
- The objective of this quality analysis report is to assess the quality of the mobile positioning data (MPD) of two Omani Mobile Network Operators (MNO) – OmanTel and Ooredoo for the purposes of OmanPos pilot project.
- Assess feasibility for the generation of such statistics
- Both of them got the data requirement checklist and there were special meetings in order to explain the technicalities of the checklist.
- Quality indicators :
  - Subscriber
  - Time
  - Location
  - Country of origin

# Quality checks

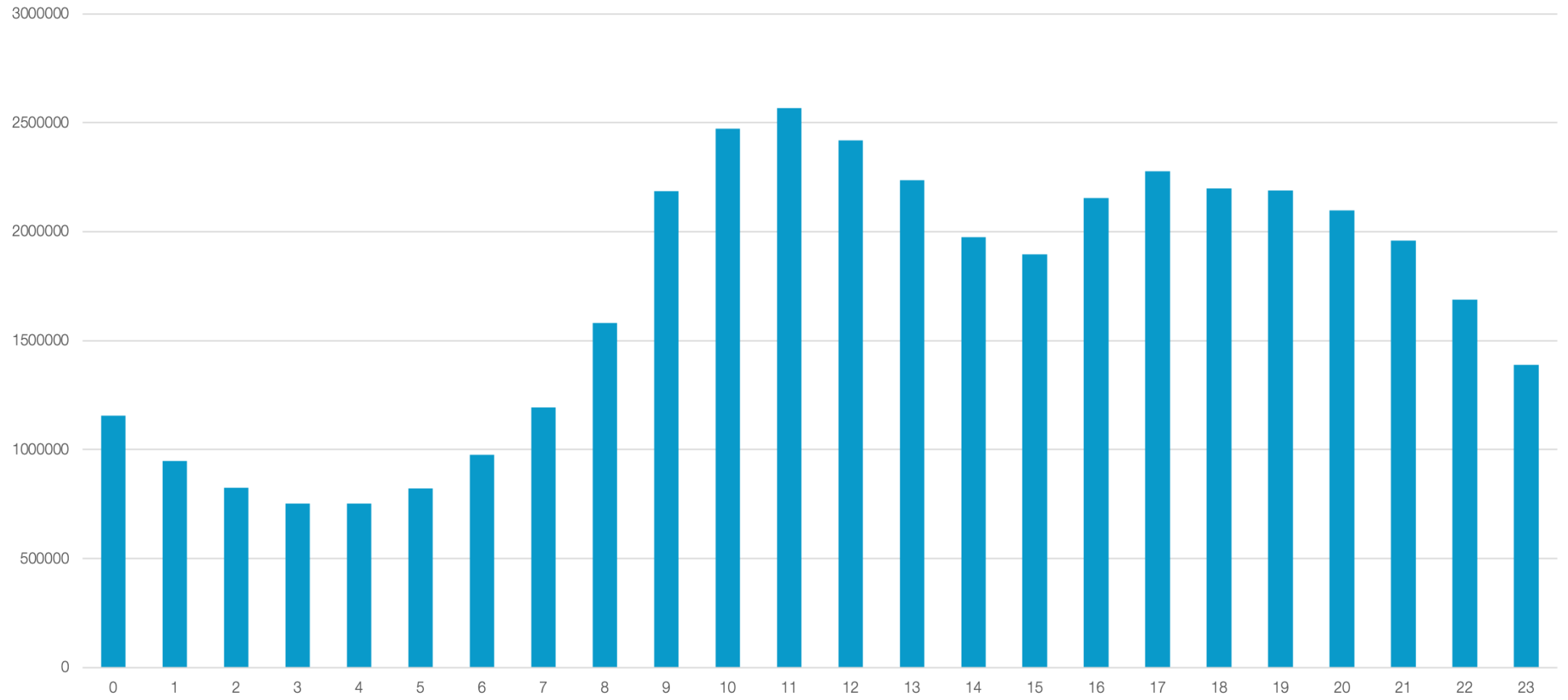
Coverage of all cells MNO provided



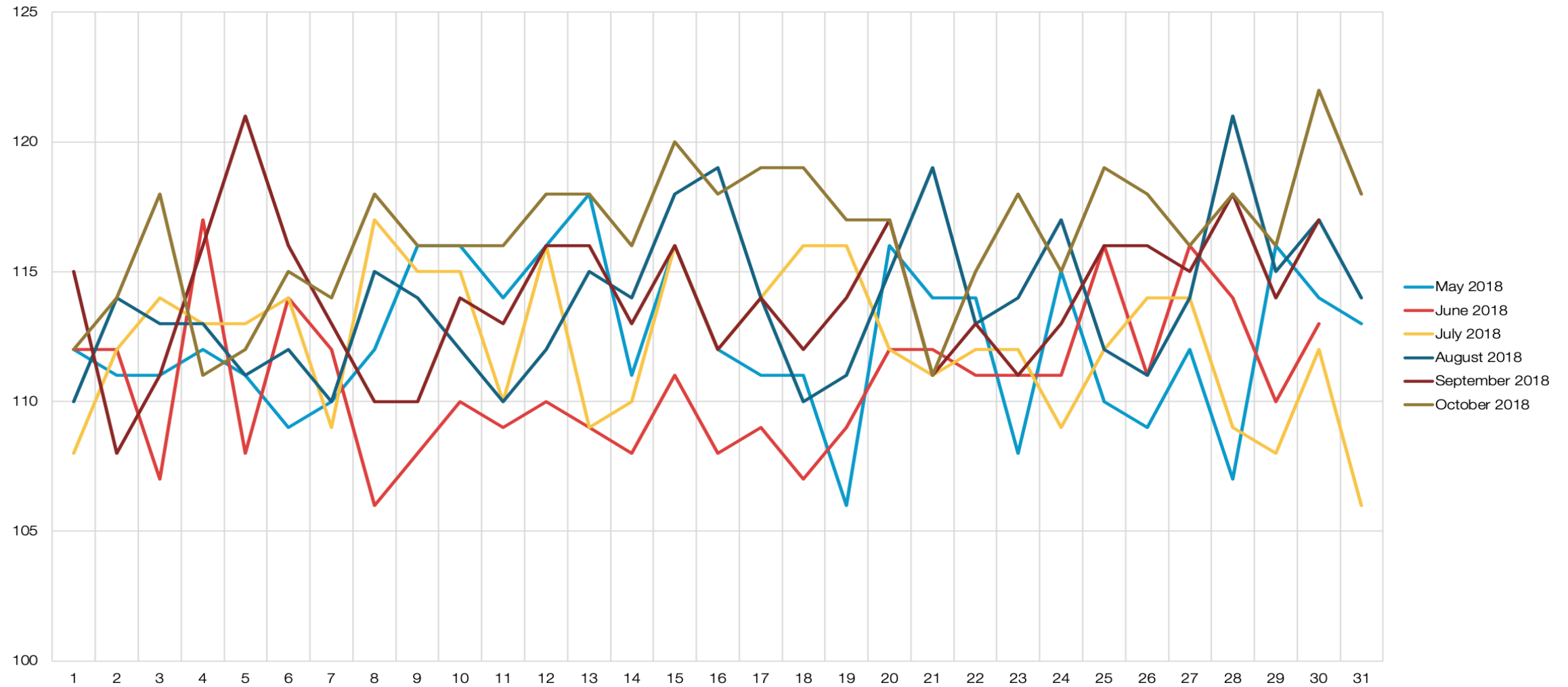
Coverage of the cells included in the event data provided by MNO



Diurnal distribution of domestic MPD events for OmanTel for May-October 2018



Number of distinct countries in inbound MPD events for OmanTel for May-October 2018

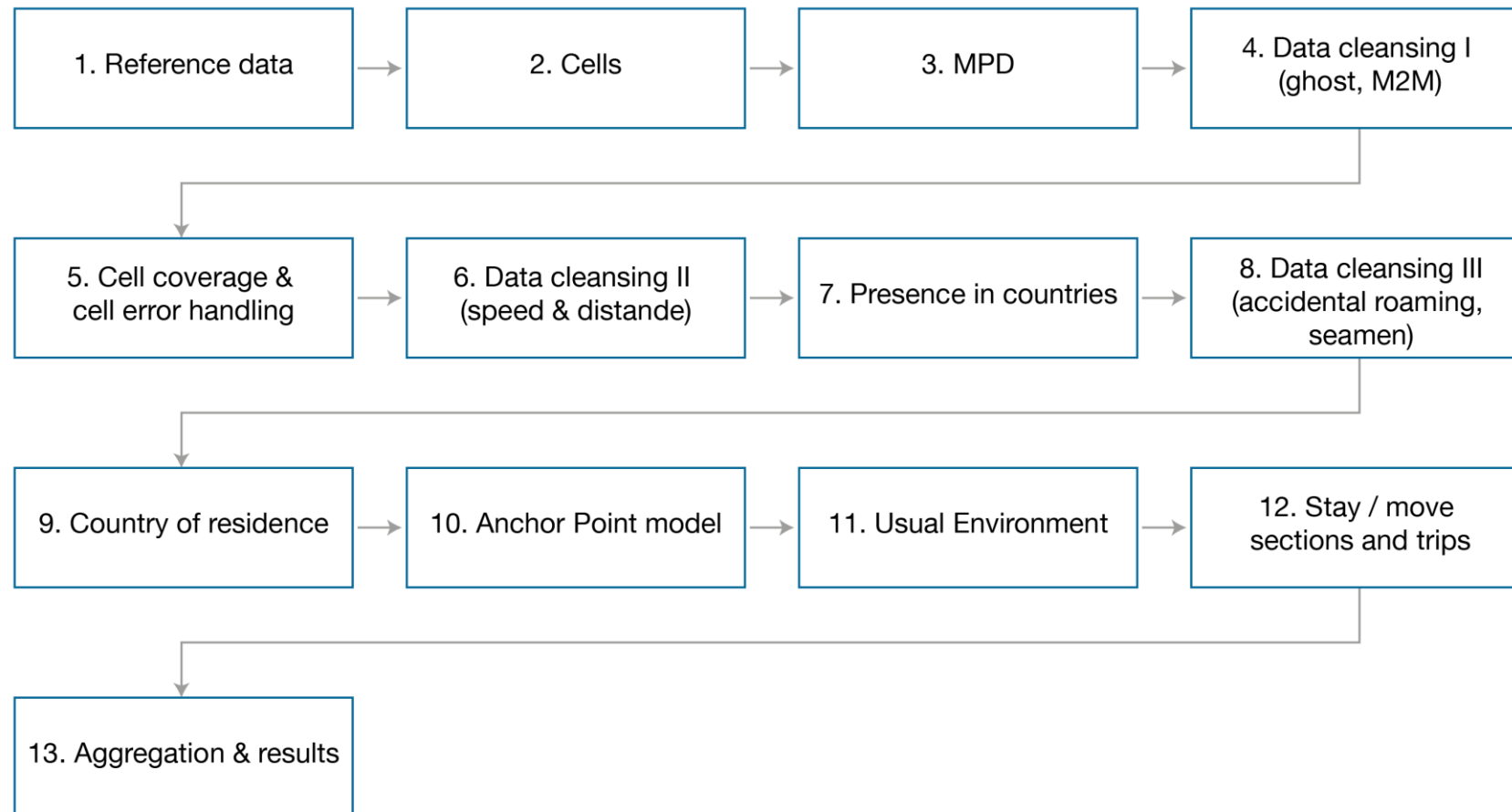


## Phase 2

# Development of the methodology for generating statistics from MPD

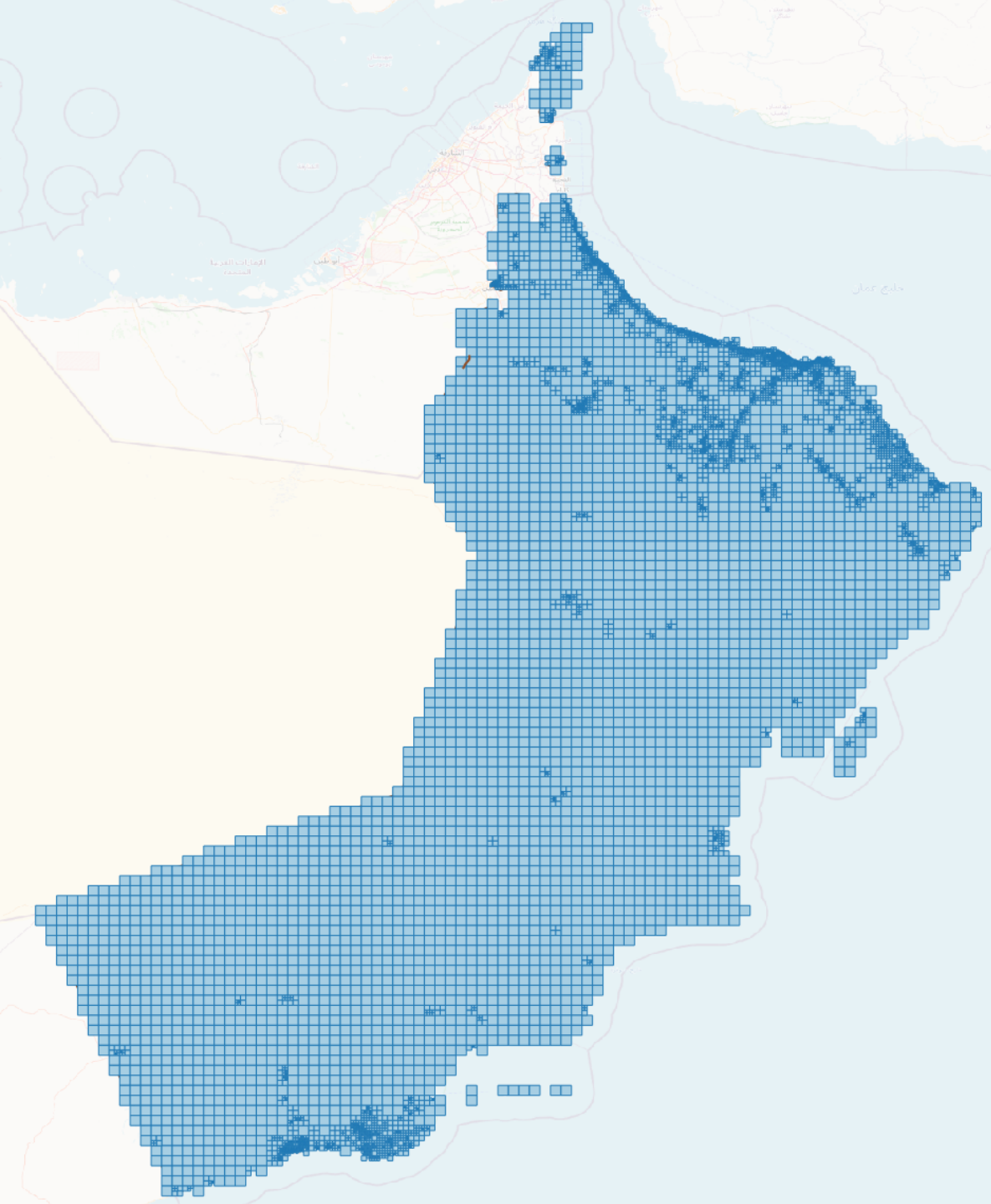


# Methodology of Processing Raw MPD data



# Data Cleansing

- Machine-to-Machine (M2M) Filter
- Cell cover and cell error prediction
- Speed and Distance Filter
- Presence in Countries
- Accidental Roaming Filter
- Seaman Filter
- Country of Residence



- Home: place of residence (POR),
- Secondary home anchor point (SHAP);
- Work: work-time anchor point (WTAP),
- Secondary work-time anchor point (sWTAP);
- Other regular anchors: regular anchor point (RAP).

# Animation of daily arrivals of inbound tourists in Oman

January – June 2020

Numbers show the number of tourists from top 10 countries

# Animation of the changes in the number of work-time stays in Northern Oman over a 7-day period

January 2020

The number of stays includes only persons who had  
both place of residence and work-time stays in the reference period

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# Animation of origin-destination matrices in Oman over a 10-day period

January 2020

Aggregated domestic movements between provinces

# Big Data Project

January, 2020

SU	MO	TU	WE	TH	FR	SA
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1

Choose layer

Inbound tourism statistics: general

Choose area unit

Wilayat

Day / Month

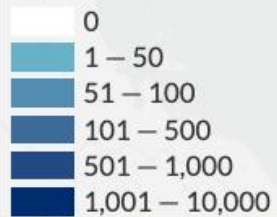
Day

Choose country

United Arab Emirates

Remarks

Number of inbound tourism  
trips from selected country



# Thank you