



OsmAnd

MAPS & NAVIGATION





Who we are

OsmAnd.net



**We are a small
team of 10**



**Over 100
contributors**



**8 years of
developing**



**More than
1 million
active users**



What is OsmAnd Live



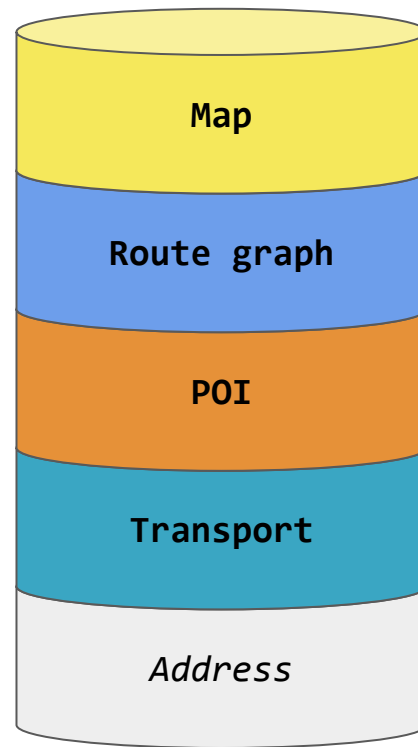
- Small & fast incremental map updates for offline maps
 - 1-5 MB per day per country
- Updates are generated for every 10 minutes changes
- Average delay to deliver map 15 minutes





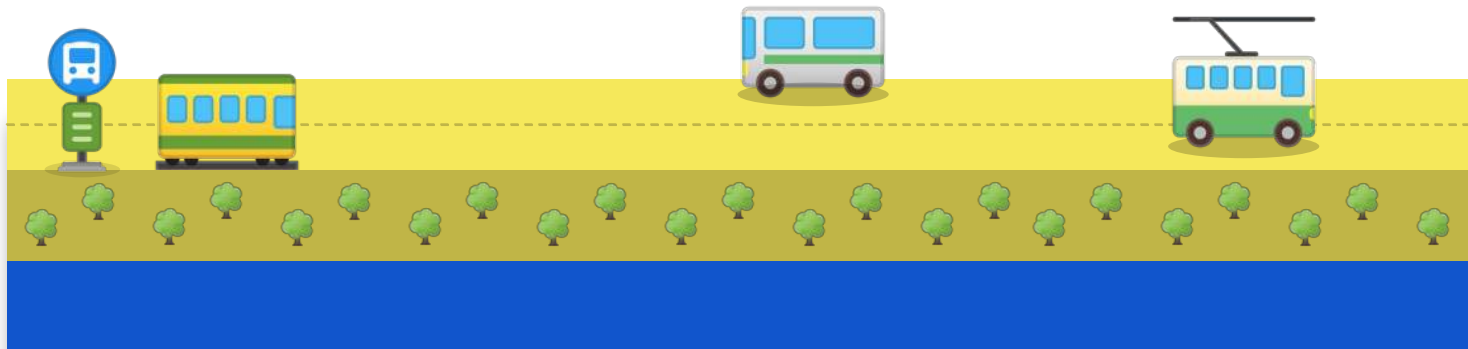


- Incremental Updates always target specific format
 - If target format is OSM.xml, diff format OSC.xml
- OBF (OsmAnd binary format):
 - 5 independent layers





- Updates relies on primitives:
 - OSM.xml - node/way/relation - diff
 - OBF Map / Routing - geometric object (polygon, line, point)
 - OBF POI / Address - search keyword
- To identify changes versioning should be used
 - Id + version
 - Note: OSM doesn't provide geometric versioning





Requirements



This is our 3rd generation of OsmAnd Live.

Requirements:

- Make possible to rebuild incremental updates from the past
- Speed of updates is **2x** than speed of changes
 - Generating 10 minutes updates should take < 5 minutes
- Tools should be resilient and data is backed up



How we do it



Generic approach how to generate delta maps

1. Generate complete map with your primitives **before** and **after** including all possibly changed primitives
2. Compare complete maps and generate delta map
3. Split delta map by regions and serve them



Approach how to store and serve

1. Generating maps every 10 minutes will produce 240 delta maps *daily* and 1000 delta maps *monthly*
2. Every missing delta map could cause map errors

Solution:

- Group delta maps by **day** and by **month** (excl last day)
- Clients keep maximum 5-7 maps per month per region



Overpass query to retrieve “complete” data

```
[timeout:3600][maxsize:2000000000]
[date:\"$END_DATE\""]; or [date:\"$START_DATE\""];
( node(changed:\"$START_DATE\"",\"$END_DATE\");
  way(changed:\"$START_DATE\"",\"$END_DATE\");
  relation(changed:\"$START_DATE\"",\"$END_DATE\"); )->.a;
  (way(bn.a);.a) ->.a; // retrieve all ways for all nodes
  (relation(bn.a);.a) ->.a; // retrieve all relations for all nodes
  (relation(bw.a);.a) ->.a; // retrieve all relations for all ways
  (way(r.a);.a) ->.a; // retrieve all members for all relations
  (node(w.a);.a) ->.a; // retrieve all nodes for all ways
.a out geom meta;
```



Tools



- Overpass - tool to retrieve data
 - Quick (5x speed to apply changes) - 20%, (3x to retrieve data) - 33%
 - Retrieves all historical data in the past, possible to **replay** data
- OsmAndMapCreator
 - Generation target world file
 - Comparison obf and delta generation
 - Split by region
 - Combine by day / month



Donations to OpenStreetMap Contributors



OsmAnd Live is a paid feature

- 50% to the OsmAnd Team
- 50% to OSM contributors (everybody could register)



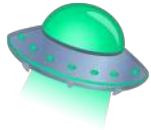
Since 2016:

We paid out **22.632 BTC**



Awards for contribution:

- All contributors ranked by **7 groups**
- Each group receives same amount



Future of data



- All projects around OpenStreetMap are built on open data
- OsmAnd uses ***OpenStreetMap, Wikipedia, Wikivoyage***
- Each portion of data deserves own format
- Each application deserves own derived format
 - obf
 - overpass
 - osm.xml, pbf, o5c...



- Each format has same lifecycle
 - Convert
 - Distribute
 - Update
- Extra GEO Features
 - Partition by countries
 - Incremental and distributed downloads



- Possible affected formats / application
 - OBF / OsmAnd
 - Overpass / Overpass Query Engine
 - Postgis / Mapnik
 - Overpass / Achavi
 - Postgis (osm2pgsql) / OSM Validation tool
 - TIFF + DEM data / Any router tool
 - Wikimedia data / Any end user application



Technology proposal



Can we build an **application network** that will support:

- Registry of data with License / owner information
- Aka torrent distributed downloads
- Partition data by geo bbox
- Supports data streaming and delta updates
- Have an easy to use server and desktop client



**Let's build it
together**



Thank you!