

170120-

# OH om Vector Tiles fvb Prezi

som kan visa uppföringar av [http://localhost/ol4/OSM-VectorTiles\\_ol4\\_mapzen\\_topojson\\_ans170311.html](http://localhost/ol4/OSM-VectorTiles_ol4_mapzen_topojson_ans170311.html) *mkt bättre.*

[Anders.Soderman@GISassistANS.se](mailto:Anders.Soderman@GISassistANS.se)

[www.GISassistANS.se](http://www.GISassistANS.se)

# *Vector*

# *Tiles*

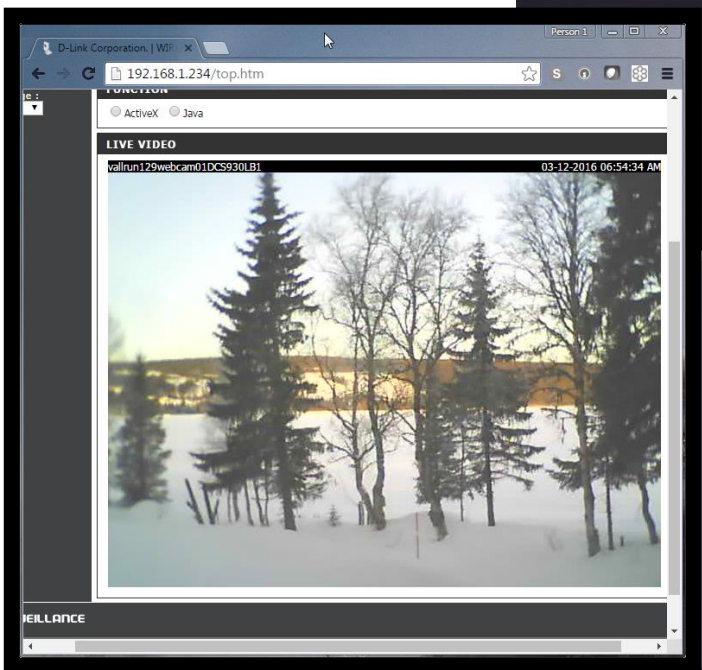
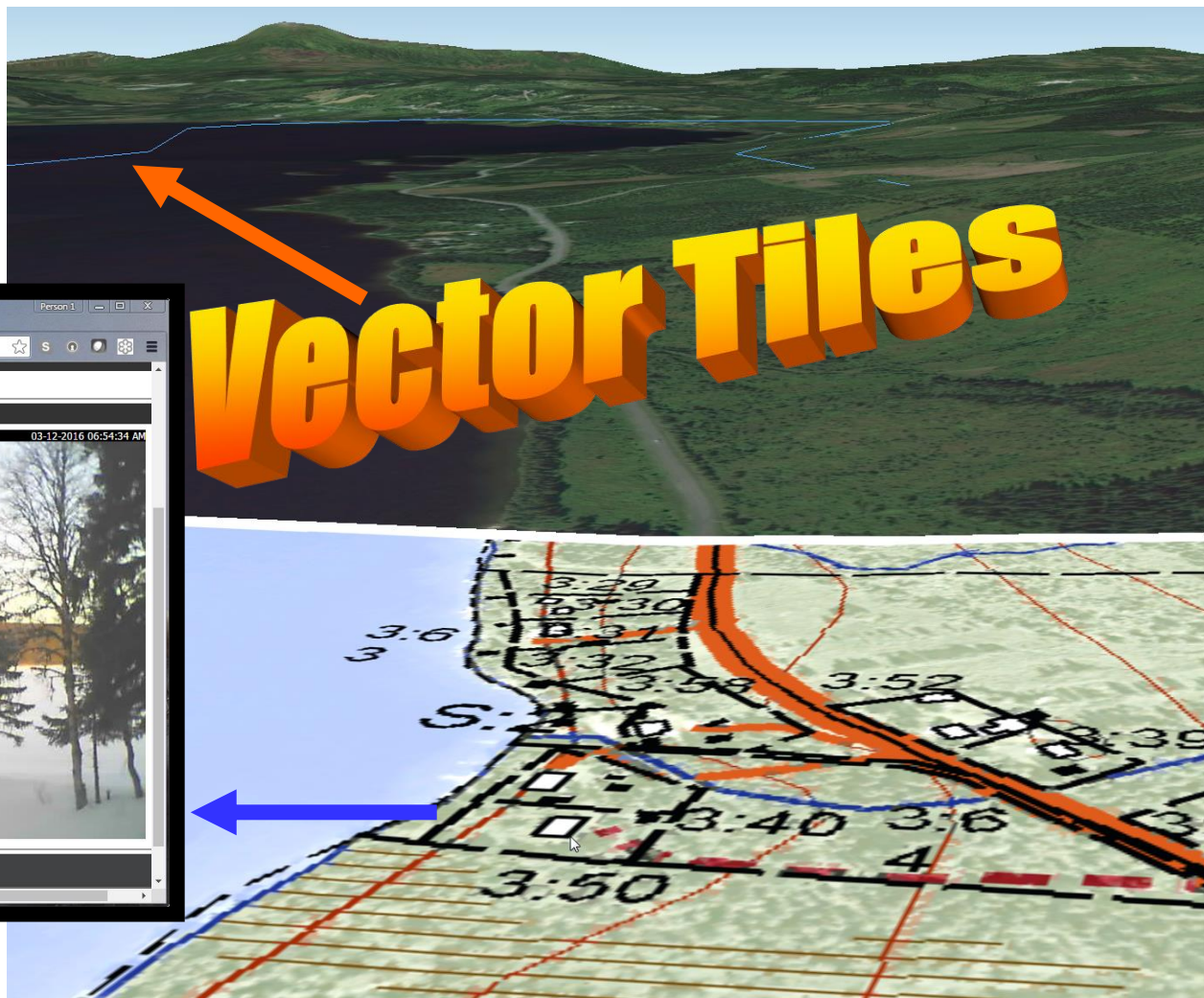






170324 *Nu kan du få en  
"intelligent shape-fil"  
som geodatatjänst !!*

# F&U (webbkartografi) hos GaAB ej Internet      ej tunnelbana      ej affär men radiolänk, cykel och röding i sjön!



# Är tiden mogen för

# ”SLD enabled WMS”

# istället för nedladdade shapefiler?

Anders Söderman GISassistANS AB

Kartdagarna 2016 **Gävle** 27 april 2016 11:00–12:30

**KART  
DAGARNA** 2016 **Är tiden mogen... - Nej!** GISassistANS AB

**Rubrik:** Är tiden mogen för "SLD enabled WMS" istället för nedladdade shapefiler?  
**Sammanfattning:** Användare som efterfrågar hur hastigt en en databas eller en lista av externa tjänsturler (WMS) hämtar uppgifter förfrån en dator. Förutom att ge en lista över externa tjänsturler (WMS) som kan användas för att hämta data från en dator. Förutom att ge en lista över externa tjänsturler (WMS) som kan användas för att hämta data från en dator. Förutom att ge en lista över externa tjänsturler (WMS) som kan användas för att hämta data från en dator.

- Många WMS-tjänster tillåter ej SLD-enabled WMS
- Små men viktiga/irriterande skillnader i hur SLD implementerats.
- Vissa WMS-tjänster klarar inte SLD (deegree)
- Mycket svårt (och långsamt) att få WFSer att fungera
  - Ex. WFS som datakälla i GeoServer
  - Ex. WFS i remote\_ows\_type=WFS&remote\_ows\_url=http...
- Avsaknad av "Portrayal Registry", dvs närliggande SLDer via http-anrop.
- Avsaknad nödvändiga uppgifter om WMS/WFS (lagerinfo, bl.a. attribut)

**TEKNIKEN FINNS MEN SVERIGE MÅSTE BÖRJA LEVA UPP TILL "ÖPPNA DATA". Avsaknad av gemensamma symboler försvarar!**

# Tiden är nu mogen för **Vector Tiles** istället för nedladdade shapefiler!

**Anders Söderman GISassistANS AB**  
**Kartdagarna 2017 Örebro** 29 mars 2017 09:00–10:30



## 2B Webbkartor och analys

Onsdag 29 mars, kl. 9–10.30. Studion

*Sessionsledare: Jonas Nordén, Kartografiska Sällskapet*

### **WEBBKARTOGRAFI FÖR "ZOOM-NIVÅ FILTRERADE" VEKTORDATA – VECTOR TILES**

Vid direkt åtkomst till geodata i vektorform, inkluderande deras attribut, underlättas möjligheterna att utifrån egenskaperna hos geodata (attribut) skapa anpassad webbkartografi. Vilka är möjligheterna och begränsningarna för webbkartografi med Vector Tiles?

*Föreläsare: Anders Söderman, GISassistANS AB*

... hur många har **hört talas om** Vector Tiles?



Inled med ett antal frågor. Dolda svar tills auditoriet fått svara. Förvänta inte svar, utan låt frågorna vara typiska för de frågeställningar jag har haft.

... hur många har **hört talas om** Vector Tiles?

... hur många har **testat** Vector Tiles?



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... hur många har **hört talas om** Vector Tiles?

... hur många har **testat** Vector Tiles?

... hur många har **jobbat med eller erbjuder** Vector Tiles?



Inled med ett antal frågor. Dolda svar tills auditoriet fått svara. Förvänta inte svar, utan låt frågorna vara typiska för de frågeställningar jag har haft.



Utdrag från **sisTK570-webbkartografi (WMS)** :

- Webbkarttjänster gör det möjligt för en aktör att **kombinera kartskikt** till en webbkarta, trots att dessa har producerats oberoende av varandra av olika myndigheter och andra organisationer.
- sisTK570 handlar om hur man bör konstruera en webbkarttjänst så att **dess kartskikt blir så användbara som möjligt när de kombineras med kartskikt från andra webbkarttjänster**.
- Den allt övergripande riktlinjen är att webbkarttjänster bör **erbjuda alternativa kartskikt** på ett sätt som underlättar arbetet med att välja och kombinera lämpliga kartskikt **så att läsbara och begripliga webbkartor uppstår (målgrupp – syfte)**.

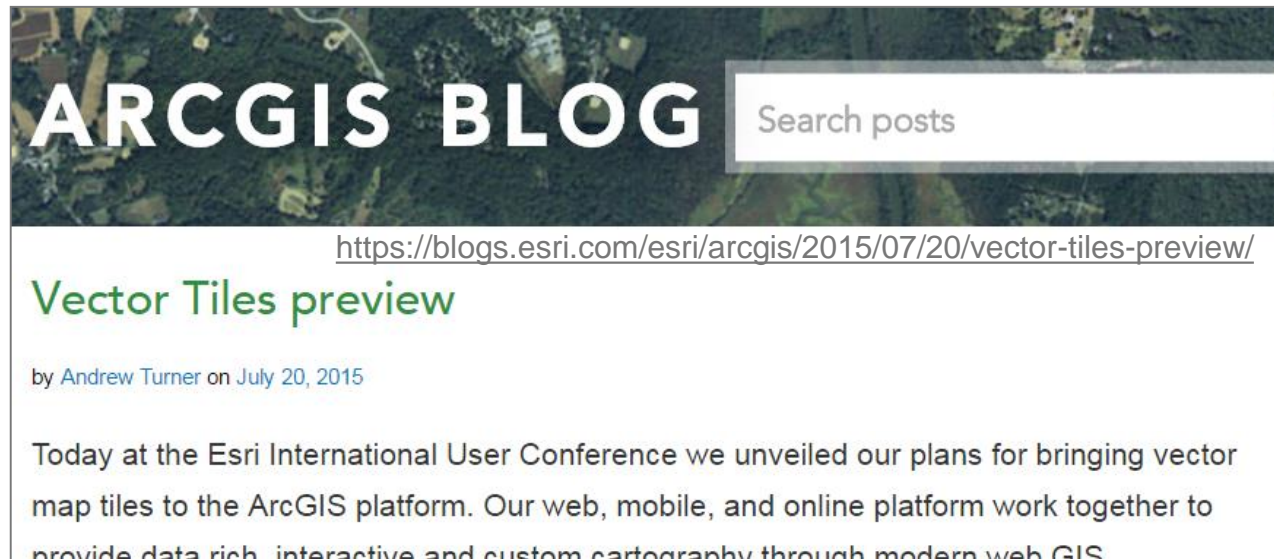
18 juni lör 2016-06-18 08:35:18 **VECTOR\_TILES** var gårdagens stora frågetecken efter att jag tittat på

<https://blogs.esri.com/esri/arcgis/2015/07/20/vector-tiles-preview/>

Today, vector tiles are a new representation that exploits these technologies to drive dynamic, **interactive cartography that can be customized and personalized for every person directly on their mobile device or web browser** – removing the need to pre-cache different styled tiles as well as providing access to the underlying data in each tile. Barriers between the basemap and operational data dissolve with contextual vector base maps enabling interactive data enrichment and exploration of operational layers.

People can dynamically style basemaps and design tiles for operational use combining interactive data exploration, smart mapping and realtime analyses with the contextual, styled basemap.

Vector Tiles ”upp-täckte” jag för knappt ett år sedan och all information är fortfarande väldigt ostrukturerad.



- Det tog mig nästan ett halvår att tränga in i vad Vector Tiles är och att kunna visa egna exempel på dess möjligheter.
- Det lossnade först för en vecka sedan onsdagen den 22/3 och då hade jag i det närmaste gett upp!
- Det innebar också att jag tvingats börja lära mig **OpenLayers 4**, vilket jag gärna väntat med ett tag.

En sida ur min, just nu, 189 sidors projektdagbok



[mapbox://styles/mapbox/satellite-v9](https://www.mapbox.com/mapbox-gl-js/style-spec/#layers-fill)  
[mapbox://styles/mapbox/satellite-streets-v9](https://www.mapbox.com/mapbox-gl-js/style-spec/#layers-fill)

14 mars 2017-03-14 06:08:36

Långt ViP samtal utan att det blev till hjälp. Frågan är dock – SKA JAG SATSA PÅ OL4 KOD ELLER MVT ELLER Mapzen ELLER .... Just nu är det en salig blandning av kod!!!



<https://www.mapbox.com/mapbox-gl-js/style-spec/#layers-fill>

```

"paint": {
  "fill-outline-color": "#00FF00"
}

```

AnS: Ger en grön 1pxl rand.

```

"fill-color": "#FF0000"

```

Lägger jag till **fill-color** så blir fönstret VITT!! Dvs inga

**idiot!!!**

geodata syns.

```

}, {
  "id": "buildings",
  "type": "fill",
  "source": "osm",
  "source-layer": "buildings",
  "paint": {
    "fill-color": "#FF0000",
    "fill-outline-color": "#00FF00"
  }
}

```



Nästa steg är att sätta tjockleken på " outline "

<https://www.mapbox.com/mapbox-gl-js/style-spec/>

15:37:21 Det verkar som om "Stroke" av ytiskt bara "finns" med 1pxl tjocklek !!!!! Jobbar vidare och ser om jag stöter på info om detta framöver de 14 dagar jag har på mig 3 dagar innan nedresan med vintertid hade jag haft gryning 04:45 - på väg till Ösd!!! :( mars17: 25 05:42 18:31 26 06:38 19:33 Ja 27 06:35 19:36 Ja 28 06:31 19:39 Ja

- Sparsamt med hjälp via Internet och den hjälp jag hittade krävde mer eller mindre att jag till 90% visste vad Vector Tiles är!
- Få klienter och jag fick tyvärr glömma QGIS, uDig och istället ta mig an ol3/ol4 som klarar Vector Tiles. Valde ol4?
- Efter fyra månaders (okt16-feb17) fruktlösa försök att själv, via Geoserver 2.10.1, generera/stilsätta Vector Tiles började jag testa MapBox Studio, som kräver att alla geodata "förvaras" i deras moln.
- Fortfarande svårt att greppa hur generaliseringen sker för vektorer och attribut i de olika "Tile-nivåerna". (ofta z01-z20)
- Svenska Vector Tiles -källor?? (...chans till webbkartografistandardisering!!)
- QGIS klarar .pbf (protobuf), men inte .mbtiles, som verkar vanligast. Svårt att hitta test data att jobba med själv. MapBox Studio tvång??!



- I WMS sade SLD en hel del – i Vector Tiles är allt ”inbakat” och det blir ofta överaskningar när maér ändras eller geodata bara ”dyker upp”.
- Vector Tiles har ”inbyggd Bounding Box”, dvs ditt Windowsfönster, om du kör Windows.
- Vector Tiles har ”inbyggda skalintervall” som ”vet” vad som ska visas från geometrier och attribut.
- Vector Tiles har ” inbyggd geometri filtrering”, ofta i 20 st. zoom-intervall.
- Vector Tiles har ” inbyggd attribut filtrering”,

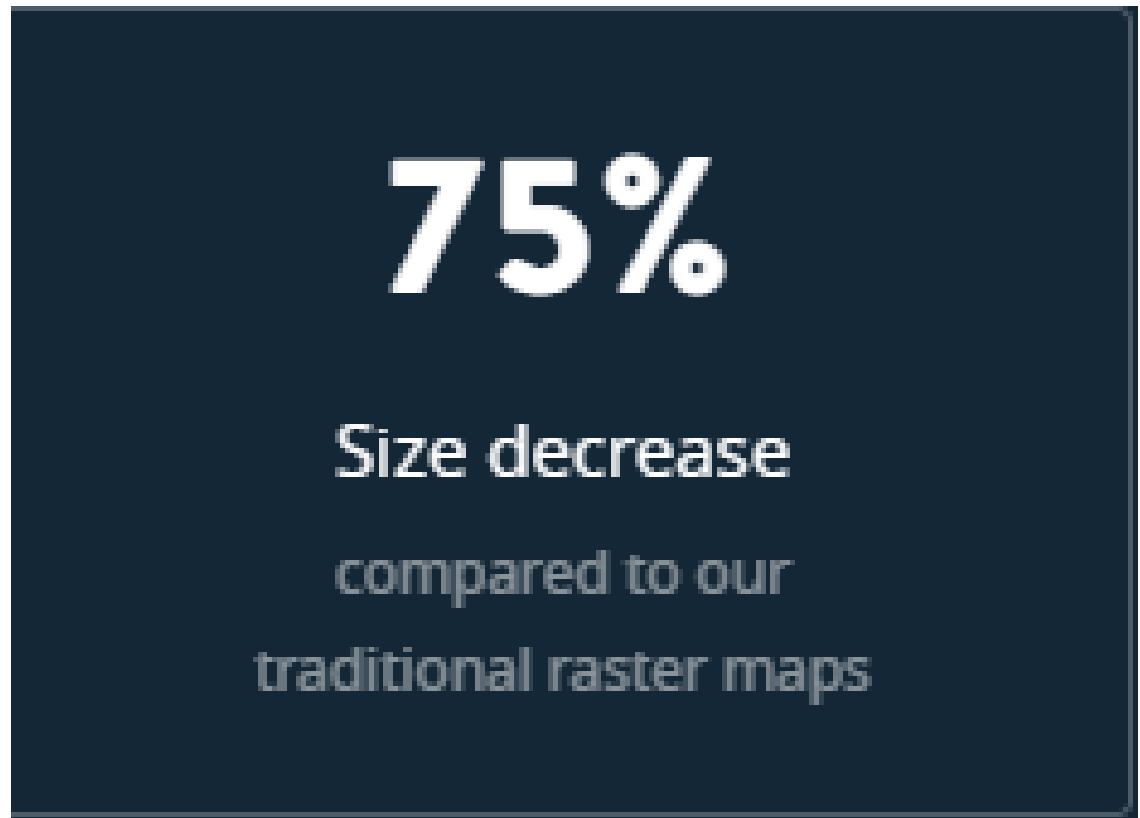
- ... och analys ??
- Det är precis det Vector Tiles INTE är till för, dvs analys – välj då WFS!
- Vector Tiles är för presentation av en "intelligentare" karta än vad en WMST är, dvs "tilead" raster-karta, eftersom vi får med oss tillgången till vektorernas attribut.
- Attribut för både presentation vid ex. "mouse over" eller för att låta attribut egenskaper påverka utseendet med stilsättning via klienten, dock ej analys!

**2B Webbkartor och analys**  
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Vid direkt åtkomst till geodata i vektorform, inkluderande deras attribut, underlättas möjligheterna att utifrån egenskaperna hos geodata (attribut) skapa anpassad webbkartografi. Vilka är möjligheterna och begränsningarna för webbkartografi med Vector Tiles?  
Föreläsare: Anders Söderman, GISassistANS AB

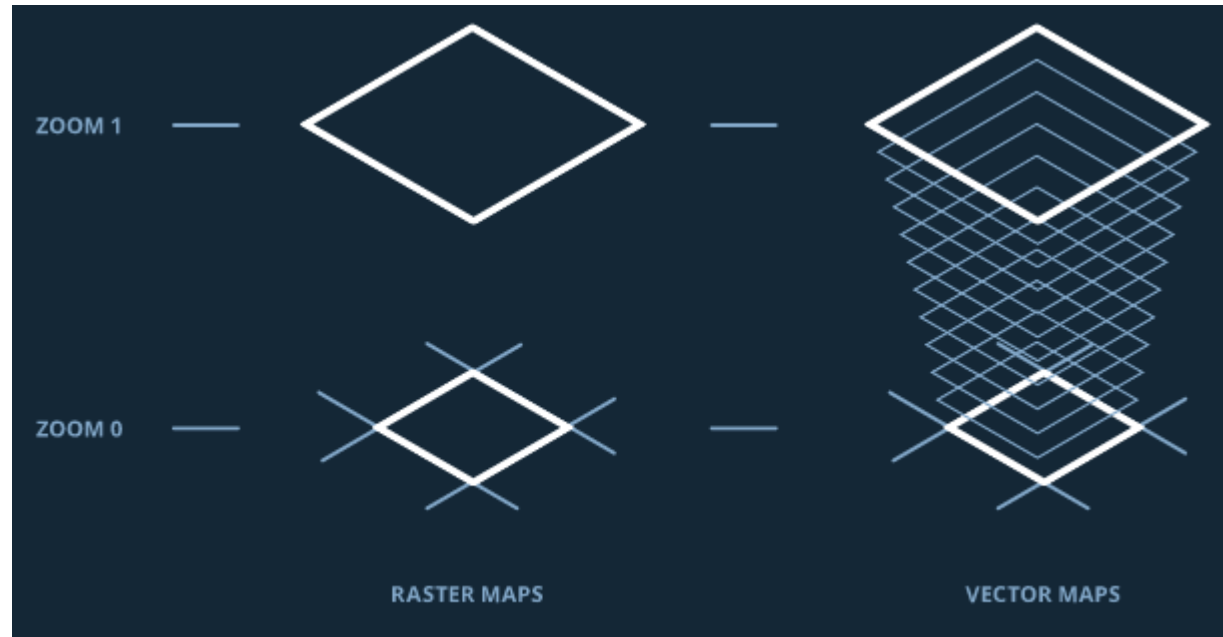
The screenshot shows a web mapping application interface. On the left, a 'New layer' panel is open, showing configuration options for a layer from data. The source is 'vectortiles\_osm\_ans161025\_swe-dofsu6' with a 'landuse' filter selected. The type is set to 'Fill'. The zoom range is from 0 to 22. The filter is set to 'Polygon'. A 'Create layer' button is at the bottom.

On the right, a 'Search tilesets' panel is open, showing a list of available tilesets. The 'Vector Terrain V2' tileset is selected, showing a list of features like 'contour', 'hillshade', and 'landcover'. Below it, the 'Mapbox Streets V7' tileset is shown with features like 'admin', 'aeroway', and 'airport\_label'. At the bottom, an 'Unused sources' panel shows a list of sources, including 'Mapbox Satellite' and 'vectortiles\_osm\_ans161025\_swe-dofsu6'.

- Maps render at a super-high framerate — allowing the maps to fluidly respond to user feedback or scripted events and opening up a whole new class of apps.
- Vector maps are roughly one-fourth the size of traditional raster implementations, which means greater performance in low-bandwidth environments and greater cost savings where bandwidth is expensive.



- Vector maps animate scale changes on the fly, providing smooth zooming on mobile and desktop devices.
- You can rotate the map, tilt it, and zoom in and out fluidly.
- Icons and labels adjust to maximize legibility from any angle





# Access your data

- The data for every feature you see in a vector map resides on the client, not the server.
- That means data can be instantly queried, allowing for flexible map changes and user interfaces that adapt to the map automatically.



- Mapbox vector tiles (.mvt) is a custom open specification how vector tiles should be structured.
- When Mapbox introduced it's geography tool **Mapbox Studio** in 2013 they created the **Mapbox Vector Tiles Specification** which is implemented by a variety of tools and clients including Mapbox GL JS, **Open Layers 3** (.11?), Leaflet, Mapzen Tangram and Esri.
- The **GeoPackage Encoding Standard** is the OGC counterpart to the Mapbox Vector Tiles Specification which was introduced later and is supported by QGIS, ESRI and GDAL.
- **Google Maps** is using vector tiles since 2010 under the hood and was the first provider implementing this. Styling is limited and the format proprietary.

Vector Tiles from OpenStreetMap --- Thesis University of Applied Science Rapperswil Fall 2015 Author(s): Lukas Martinelli, Manuel Roth  
Advisor: Prof Stefan Keller

- **.mbtile** is a filetype that can contain either raster or vector tiles. Think about it like an Adobe Illustrator .ai file.
- If the Metadata table contains a record format=**pbf** then the **.mbtiles** is a vector tiles and not raster.
- SQLite database can be a container for vector tiles **.mbtiles** which have **tile\_data blob field PBF -Protocol Buffers - protobuf** in the Tiles table ( <https://github.com/google/protobuf> – language neutral platform neutral mechanism for serializing structured data) developed by Google.
- Tools like **MapBox Studio** build vector tiles from GIS Vector Data and databases. <https://github.com/mapbox/awesome-vector-tiles> :  
**Parsers & Generators – Clients** ([OpenLayers 3](https://github.com/openlayers/ol3) - JavaScript vector & raster library <https://github.com/openlayers/ol3/pull/4219> ) - **Applications / Command line tools - CLI Utilities - Mapbox GL JS Plugins – Servers- Low-level utilities - Articles**

There are different formats in which vector tiles can be encoded, **none of which is an industry or de-facto standard:**

Format	MIME	Description
GeoJSON	application/json;type=geojson	Human readable, format (not tiles) widely supported
MapBox Vector (MVT)	application/x-protobuf;type=mapbox-vector	Highly compressed, widely supported by applications, not human readable
TopoJSON	application/json;type=topojson	Good for polygon coverages, human readable (but complex), not widely supported

- **Mapbox Vector Tiles:** Protocol Buffers based. No support for it in OL3.
- **TopoJSON:** JSON arc-poly topology, points encoded inline. There's a large **OSM dataset** in this format and OL3 has support for it.
- **GeoJSON:** the good and old GeoJSON format can also be used as vector tiles. OL3 can be set up to use it as easily as it does with TopoJSON.

Now, each format has its **pros** and **cons**.

The common denominator though, is that all of them can fulfill the requirement of producing geometry generalized versions of raw feature data plus alphanumeric attributes.

**MapBox Vector Tiles Pros:** compresses a bit better than the JSON text based formats with gzip compression.

**Cons:** non human readable. Limited control over resolution. Tied to Web Mercator projection by MapBox's spec, but we intend to overcome that silly limitation

**TopoJSON: Pros:** human readable. Allows to share common edges between adjacent geometries.

**Cons:** The edge sharing is easy to implement from raw OSM data which in itself is a topology. For non topology based data, figuring out the common edges is a slow and resource consuming process.

The format can be written with duplicated arcs but kind of defeats its purpose. Yet for the time being we're producing it without the extra complexity that computing common edges implies. Another con is that it can't be produced in a streaming way, since the topology needs to be built in memory before encoding.

**GeoJSON: Pros:** human readable. Streaming.

**Cons:** May compress a bit worse than TopoJSON. Yet to be determined. It should compress worse than TopoJSON when the later is encoded with shared edges.



Vector Tiles (VT) formaten dyker upp lite här och där i Geoserver ...men OBS – inga VT's börjar genereras av Geoserver förrän du gjort ett GetMap anrop!

Tile-bildformat

- application/json;type=geojson
- application/json;type=topojson
- application/json;type=utfgrid
- application/x-protobuf;type=mapbox-vector
- image/gif

Alla format

Välj en

- GeoTiff
- GeoTiff 8-bitars
- JPEG
- JPEG-PNG
- KML (enkel)
- KML (komprimerad)
- KML (nätverkslänk)
- OpenLayers
- PDF
- PNG
- PNG 8-bitars
- SVG
- Tiff
- Tiff 8-bitars
- UTFGrid
- application/json;type=geojson
- application/json;type=topojson
- application/x-protobuf;type=mapbox-vector**
- WFS
- CSV

Välj en

## GeoServer

Status

Cache-lagring

### Cachelagringsstandard

Konfigurera de globala inställningarna för den inbäddade GeoWebCache  
Gå till den inbäddade GeoWebCache hemsidan

**Tillhandahållna tjänster**

- Aktivera direkt integration med GeoServer WMS
- Aktivera WMS-C tjänst
- Aktivera TMS-tjänst
- Aktivera datasäkerhet

**Standardinställningar för cachelagring av GeoServerlager**

- Automaticly configure a GeoWebCache layer for each new layer or layer group

Tile-läsningmekanism  
Välj en

Automatisk cachelagring av stilar som inte är standardstilar

Standardstorlek metafile:  
4 tile-bredd genom 4 tile-höjd  
Standard för fästmarginestorlek i pixlar  
0

Standard tile-bildformat för:

Lagergrupper	Rasterlager	Lagergrupper
<input type="checkbox"/> application/json;type=geojson	<input type="checkbox"/> image/gif	<input type="checkbox"/> application/json;type=geojson
<input type="checkbox"/> application/json;type=topojson	<input checked="" type="checkbox"/> image/jpeg	<input type="checkbox"/> application/json;type=topojson
<input type="checkbox"/> application/json;type=utfgrid	<input checked="" type="checkbox"/> image/png	<input type="checkbox"/> application/json;type=utfgrid
<input type="checkbox"/> application/x-protobuf;type=mapbox-vector	<input type="checkbox"/> image/png8	<input type="checkbox"/> application/x-protobuf;type=mapbox-vector
<input type="checkbox"/> image/gif	<input type="checkbox"/> image/vnd.jpeg-png	<input type="checkbox"/> image/gif
<input checked="" type="checkbox"/> image/jpeg		<input checked="" type="checkbox"/> image/jpeg
<input checked="" type="checkbox"/> image/png		<input checked="" type="checkbox"/> image/png
<input type="checkbox"/> image/png8		<input type="checkbox"/> image/png8
<input type="checkbox"/> image/vnd.jpeg-png		<input type="checkbox"/> image/vnd.jpeg-png

In Memory BlobStore Options

Enable

Gridset	CRS	Tile-dimensioner	Zoomlägen	Diskanvändning
EPSG:4326	EPSG:4326	256 x 256	22	0,08
EPSG:900913	EPSG:900913	256 x 256	31	0,08

Lägg till standardgridset

Överlämna Avbryt

- Map** A **map** is made of **layers**, a **view** to visualize them, **interactions** to modify map content and **controls** with UI components.
- View** The view manages the visual parameters of the map view, like resolution or rotation.
- Layers** Layers are lightweight containers that get their data from **sources**.
- Projections** All coordinates and extents need to be provided in view projection (default: EPSG:3857).

<https://openlayers.org/en/latest/apidoc/>

<h2>Map</h2> <p>A <b>map</b> is made of <b>layers</b>, a <b>view</b> to visualize them, <b>interactions</b> to modify map content and <b>controls</b> with UI components.</p> <ul style="list-style-type: none"> <li>Overview</li> <li>Creation</li> <li>Events</li> </ul>	<h2>View</h2> <p>The view manages the visual parameters of the map view, like resolution or rotation.</p> <p><a href="#">ol.View</a> with center, projection, resolution and rotation</p>	<h2>Layers</h2> <p>Layers are lightweight containers that get their data from <b>sources</b>.</p> <ul style="list-style-type: none"> <li><a href="#">ol.layer.Tile</a></li> <li><a href="#">ol.layer.Image</a></li> <li><a href="#">ol.layer.Vector</a></li> <li><a href="#">ol.layer.VectorTile</a></li> </ul>
<h2>Controls</h2> <ul style="list-style-type: none"> <li>Map default controls</li> <li>All controls</li> </ul>	<h2>Interactions</h2> <ul style="list-style-type: none"> <li>Map default interactions</li> <li>Interactions for vector features             <ul style="list-style-type: none"> <li><a href="#">ol.interaction.Select</a></li> <li><a href="#">ol.interaction.Draw</a></li> <li><a href="#">ol.interaction.Modify</a></li> </ul> </li> <li>All interactions</li> </ul>	<h2>Sources and formats</h2> <ul style="list-style-type: none"> <li>Tile sources for <a href="#">ol.layer.Tile</a></li> <li>Image sources for <a href="#">ol.layer.Image</a></li> <li>Vector sources for <a href="#">ol.layer.Vector</a></li> <li>Vector tile sources for <a href="#">ol.layer.VectorTile</a></li> <li>Formats for reading/writing vector data</li> <li><a href="#">ol.format.WMSCapabilities</a></li> </ul>
<h2>Projections</h2> <p>All coordinates and extents need to be provided in view projection (default: EPSG:3857). To transform, use <a href="#">ol.proj.transform()</a> and <a href="#">ol.proj.transformExtent()</a>.</p> <p><a href="#">ol.proj</a></p>	<h2>Observable objects</h2> <p>Changes to all <a href="#">ol.Objects</a> can be observed by calling the <a href="#">object.on('propertychange')</a> method. Listeners receive an <a href="#">ol.Object.Event</a> with information on the changed property and old value.</p>	<h2>Other components</h2> <ul style="list-style-type: none"> <li><a href="#">ol.DeviceOrientation</a></li> <li><a href="#">ol.Geolocation</a></li> <li><a href="#">ol.Overlay</a></li> </ul>

# Ursprungsfärgsättning i QGIS inkl lagerföljd (lagerordning fixad)

[http://tile.mapzen.com/mapzen/vector/v1/all/16/19293/24641.json?api\\_key=mapzen-ATCDnha](http://tile.mapzen.com/mapzen/vector/v1/all/16/19293/24641.json?api_key=mapzen-ATCDnha)

The screenshot shows the QGIS interface with the following layers in the legend:

- lmv\_lansindelning\_lansgrans\_s99tm
- 24641 boundaries
- 24641 buildings Point
- 24641 places
- 24641 POIs
- 24641 roads
- 24641 transit
- 24641 landuse LineString
- 24641 landuse Polygon
- 24641 buildings Polygon
- 24641 water Point
- 24641 water LineString
- 24641 water Polygon
- 24641 earth
- lmv\_lansindelning\_45\_orter\_point\_s99tm
- lmv\_1m\_tatort\_un\_10000\_s99tm wfs qlr
- Väg - framtida
- Väg - planerad
- NV Riksintresse Friluftsliv, 3:6
- LST Riksintresse Rörligt Friluftsliv, 4:2
- sgu\_Grusförekomster naturvärdesklass qlr-fil
  - Naturvärdesklass I
  - Naturvärdesklass II
  - Naturvärdesklass III
  - Naturvärdesklass oklassad
- raafmi\_data\_v1 <1:51k
- clc06\_c243\_principally\_agriculture\_nat\_veget\_se\_s99tm
- emy\_vind\_100m\_500x500\_iso1m\_ans120901
- LM\_Strandskydd\_senast\_uppdaterad\_20150331\_uppdateras\_ej PNG 50p
  - Gräns för strandskyddsområde på land (endast generellt strandskydd är aktuellt)
  - Strandlinje inom detaljplanlagt område (för strandskydd se detaljplan)
  - Strandlinje utanför detaljplanlagt område
- LM\_Strandskydd\_senast\_uppdaterad\_20150331\_uppdateras\_ej

- 24641 boundaries
- 24641 buildings Point
- 24641 places
- 24641 POIs
- 24641 roads
- 24641 transit
- 24641 landuse LineString
- 24641 landuse Polygon
- 24641 buildings Polygon
- 24641 water Point
- 24641 water LineString
- 24641 water Polygon
- 24641 earth



## Clipping

Data Store Query

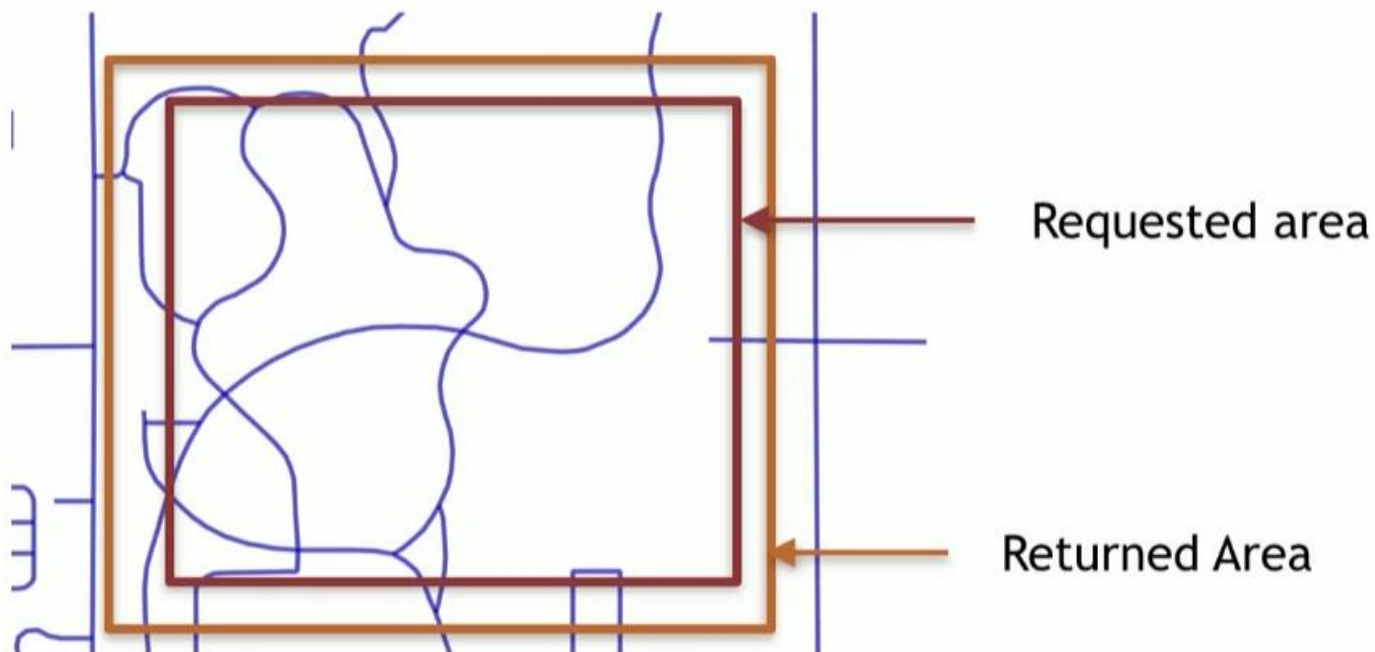
Generalize

SRS Xform

Remove small,  
redundant features

Clip

SLD



# Free Vector Tiles from OpenStreetMap

<http://osm2vectortiles.org/downloads/>

The vector tiles are under the Open Database License.

The vector tiles contain OSM data from 2016-06-20

The OSM2VectorTiles v2 tiles are meant for use with Mapbox GL JSON styles and Mapbox GL.

- The vector tiles contain OpenStreetMap data from 2016-06-20
- The OSM2VectorTiles v2 tiles are meant for use with Mapbox GL JSON styles and Mapbox GL. The no longer maintained OSM2VectorTiles v1 tiles (for use with CartoCSS and Mapnik) are available at [Downloads v1](#).
- Need any help? Check out the [documentation](#)
- Don't see your country or city listed below? Contribute by submitting a pull request on our list of [countries](#) or [cities](#), or just ask by opening a new issue.



Planet



Country



City

sweden.mbtiles	2016-10-25 05:21	1 253 690 kB
swe		
Sweden	1.2 GB	<a href="https://osm2vectortiles-downloads.os.zhdk.cloud.switch.ch/v2.0/extracts/sweden.mbtiles">https://osm2vectortiles-downloads.os.zhdk.cloud.switch.ch/v2.0/extracts/sweden.mbtiles</a>



## OSM2VectorTiles <http://osm2vectortiles.org/>

Create beautiful and fast maps for web and mobile applications with free downloadable vector tiles from OpenStreetMap. Design your own map, serve the vector tiles from your own infrastructure or use it completely offline.

**Vector tiles let you draw better maps**

**Mapzen's vector tile service** delivers worldwide coverage of OpenStreetMap base layer data, and is available in **GeoJSON**, **TopoJSON**, and **MVT binary format**. Our vector tiles can be displayed via a number of open technologies, including SVG via D3, **OpenLayers**, and WebGL

Kort video för den som vill ha mer information.

<https://youtu.be/Wh--DHRULkE>



### Contributors

We are map enthusiasts who want to make OpenStreetMap accessible for everyone again. Join us on GitHub, any feedback or improvement is greatly appreciated.



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Professor for GIS at HSR

## SWAT (161222- ): Vector Tiles – **Strenght**

[https://en.wikipedia.org/wiki/Vector\\_tiles](https://en.wikipedia.org/wiki/Vector_tiles)

...only data within the current viewport (BB BoundingBox), and at the current zoom level needs to be transferred <== största fördelen tror jag map. svarstider som alla gnäller om!!

...vector data is typically much smaller than a rendered bitmap... , resulting in faster data transfer and lower bandwidth usage.

...styling can be applied later in the process, or even in the browser itself, allowing much greater flexibility in how data is presented.

...interactivity with map features...

...less centralised server processing power is required ...

As of early 2015, there is no dominant standard for vector tiles. Approaches can differ in their URL format, data serialisation format, packaging of styling information, and support for projections other than Web Mercator.

ESRI **ArcGIS Server 10.4** and **ArcGIS Pro 1.2** released in February 2016 added support for vector tiles (supporting Mapbox's vector tiles standard )

Vector tiles allow map designers to individually design their own map.

The new era of interactive cartography – FOSS4G16Bonn Vladimir Agafonkin (Leaflet)

Zoom at fractional zoom-levels. Fasta heltalssteg är historia!!!!

Full control over data presentation in real time

Any object on the map can be interactive

Visual map editor

Integrera video direkt i kartan

Perspective view, 3D capabilities

Much less bandwidth

VectorTiles for portrayal – WFS for analysis!

VectorTiles ~> intelligent shapefile...

SLD påverkar EJ utseendet utan bara vilka geodata som läggs i resp. Tile !

Heltalszoom är historia – VectorTiles zoomar decimalt...

Rendering is done by the client (for example, OpenLayers), not by the server. This allows different maps/applications to style a map differently without having to reconfigure **GeoServer**.

The size of a vector tile is usually smaller than an image tile, resulting in faster data transfer and lower bandwidth usage.

GeoWebCache, embedded with **GeoServer** efficiently stores the vector tile data. Since styling is done by the client, not the server, GeoWebCache only needs to store one tile for all different styles.

Because the vector data is available on the client, very high-resolution maps can be drawn without corresponding increases in bandwidth.

The client has **native access to the actual feature information (attributes and geometry)**, allowing for very sophisticated rendering.

## SWAT (161222- ): Vector Tiles - Weakness

TopoJSON vector tiles are not optimized for rendering - they might clip geometries exactly at the tile boundary instead of adding a buffer, and use geographic coordinates instead of tile relative pixel coordinates in view projection

Some vector tile sources are clipped so that all geometry is bounded in the tiles, potentially chopping features in half. Other vector tile sources serve unclipped geometry so that a whole lake may be returned even if only a small part of it intersects the tile.

Moreover they are "**overzoomed**" which means that they often borrow data from upper zoom levels.



1701 15-	09:09:09 Gör nu en gCalc-VectorTiles då jag igår gjorde en chrome-VectorTiles =====>	<a href="https://docs.google.com/spreadsheets/d/1mn6OkxsFqu157XiMcrLFnb93LkKeDVkcWKKGt7k3XD0/edit#gid=0">https://docs.google.com/spreadsheets/d/1mn6OkxsFqu157XiMcrLFnb93LkKeDVkcWKKGt7k3XD0/edit#gid=0</a>
	<b>Vector tiles are a way to deliver geographic data in small chunks to a browser or other client app.</b>	<a href="http://wiki.openstreetmap.org/wiki/Vector_tiles">http://wiki.openstreetmap.org/wiki/Vector_tiles</a>
	<b>Benefits and challenges of drawing vector layers on the client side</b>	<a href="https://www.e-education.psu.edu/geog585/node/721">https://www.e-education.psu.edu/geog585/node/721</a>
	<b>PostGIS Vector Tile Utils --- A set of PostgreSQL functions that are useful when creating vector tile sources, either at the query stage in Mapbox Studio or in the earlier data preparation stages</b>	<a href="https://github.com/mapbox/postgis-vt-util">https://github.com/mapbox/postgis-vt-util</a>
	<b>I heard you like tiles... Michal Migurski, Geomeetup April 2013</b>	<a href="http://mike.teczno.com/img/Geomeetup-slides-2013-04.pdf">http://mike.teczno.com/img/Geomeetup-slides-2013-04.pdf</a>
	<b>July 20, 2015 --- Today at the Esri International User Conference we unveiled our plans for bringing vector map tiles to the ArcGIS platform.</b>	<a href="https://blogs.esri.com/esri/arcgis/2015/07/20/vector-tiles-preview/">https://blogs.esri.com/esri/arcgis/2015/07/20/vector-tiles-preview/</a>
	<b>The State of Vector Tiles --- Andrea Ross</b>	<a href="https://www.youtube.com/watch?v=se2cd3BMYRY">https://www.youtube.com/watch?v=se2cd3BMYRY</a>
	<b>Vector Tiles Part 1 --- Tobin Bradley</b>	<a href="https://www.youtube.com/watch?v=x17QkEodCac">https://www.youtube.com/watch?v=x17QkEodCac</a>
	<b>Vector Tiles Part 2 --- Tobin Bradley</b>	<a href="https://www.youtube.com/watch?v=GPArNrRL79Q">https://www.youtube.com/watch?v=GPArNrRL79Q</a>
	<b>Map tiles are dead; Long live (vector) tiles! --- IRE NICAR</b>	<a href="https://www.youtube.com/watch?v=MEhskF2JnnY">https://www.youtube.com/watch?v=MEhskF2JnnY</a>
	<b>Vector Tiles with GeoServer and OpenLayers FOSS4G NA --- David Blasby</b>	<a href="https://www.youtube.com/watch?v=xdc67aZVO7E">https://www.youtube.com/watch?v=xdc67aZVO7E</a>
	<b>Processing OpenStreetMap Into Vector Tiles - Dane Springmeyer --- OpenStreetMap US 17 juni 2016</b>	<a href="https://www.youtube.com/watch?v=5xa7eMMYH9A&amp;t=47s">https://www.youtube.com/watch?v=5xa7eMMYH9A&amp;t=47s</a>

	<b>FOSS4G 2016 Conference Programme 24th - 26th August</b>	<a href="http://2016.foss4g.org/programme.html#overview">http://2016.foss4g.org/programme.html#overview</a>
	<b>2016 - FOSS4G: Create Vector Tiles from OpenStreetMap Manuel Roth 27 aug. 2016</b>	<a href="https://www.youtube.com/watch?v=D7mmXonFlqA&amp;t=117s">https://www.youtube.com/watch?v=D7mmXonFlqA&amp;t=117s</a>
	<b>TileServer GL: Hosting vector tile maps on your own server (FOSS4G 2016 videos) --- Klokan Technologies GmbH 29 aug. 2016</b>	<a href="https://www.youtube.com/watch?v=rOq4VnSAnI4">https://www.youtube.com/watch?v=rOq4VnSAnI4</a>
<b>1702 25-</b>	<b>Geoserver to generate vector tiles out of WMS and WMTS requests, using SLD to filter the contents of the tile at the requested scale. Supported vector tiles formats are MVT (MapBox Vector Tile), GeoJSON vector tiles, and TopoJSON vector tiles.</b>	<a href="http://blog.geoserver.org/">http://blog.geoserver.org/</a>
	<b>GeoServer 2.11.x User Manual » Extensions » Vector Tiles</b>	<a href="http://docs.geoserver.org/latest/en/user/extensions/vectortiles/index.html">http://docs.geoserver.org/latest/en/user/extensions/vectortiles/index.html</a>
	<b>We'll be publishing our vector tiles through GeoWebCache and publishing the layer in a custom OpenLayers application.</b>	<a href="http://docs.geoserver.org/latest/en/user/extensions/vectortiles/tutorial.html">http://docs.geoserver.org/latest/en/user/extensions/vectortiles/tutorial.html</a>
<b>1703 15-</b>	<b>Mapzen's vector tile service delivers worldwide coverage of OpenStreetMap base layer data, and is available in GeoJSON, TopoJSON, and MVT binary format. Our vector tiles can be displayed via a number of open technologies, including SVG via D3, OpenLayers, and WebGL.</b>	<a href="https://mapzen.com/projects/vector-tiles/">https://mapzen.com/projects/vector-tiles/</a>

1703 15-	<p>Mapzen's vector tile service delivers worldwide coverage of OpenStreetMap base layer data, and is available in GeoJSON, TopoJSON, and MVT binary format. Our vector tiles can be displayed via a number of open technologies, including SVG via D3, OpenLayers, and WebGL.</p>	<p><a href="https://mapzen.com/projects/vector-tiles/">https://mapzen.com/projects/vector-tiles/</a></p>
	<p>Display Mapzen vector tiles in a map</p>	<p><a href="https://mapzen.com/documentation/vector-tiles/display-tiles/">https://mapzen.com/documentation/vector-tiles/display-tiles/</a></p>
	<p>Layers in Mapzen's vector tiles</p>	<p><a href="https://mapzen.com/documentation/vector-tiles/layers/">https://mapzen.com/documentation/vector-tiles/layers/</a></p>
	<p>Mapzen Vector Tile Service Yonggang Luo edited this page on 2 Dec 2016 · 84 revisions</p>	<p><a href="https://github.com/tilezen/vector-datasource/wiki/Mapzen-Vector-Tile-Service">https://github.com/tilezen/vector-datasource/wiki/Mapzen-Vector-Tile-Service</a></p>
	<p>Overview --- Vector tiles let you draw better maps Mapzen's vector tile service delivers worldwide coverage of OpenStreetMap base layer data, and is available in GeoJSON, TopoJSON, and MVT binary format. Our vector tiles can be displayed via a number of open technologies, including SVG via D3, OpenLayers, and WebGL.</p>	<p><a href="https://mapzen.com/projects/vector-tiles/">https://mapzen.com/projects/vector-tiles/</a></p>
	<p>Mapzen och MapBox GL</p>	<p><a href="https://mapzen.github.io/mapboxgl-vector-tiles/">https://mapzen.github.io/mapboxgl-vector-tiles/</a></p>

*Tack!*

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öx!

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# Vector Tiles



... hur många har **hört talas om** Vector Tiles?

... hur många har **testat** Vector Tiles?

... hur många **jobbar med eller erbjuder** Vector Tiles?

Denna presentation innehåller bilder med alldeles för mycket text – det är jag väl medveten om.

Min tanke är att om du blir intresserad av Vector Tiles närmaste tiden kan du gå tillbaka och få några ingångar till mer information.

Min ursprungliga plan var att installera senaste Geoserver versionen 2.10.1 RC1 (port 8090) och själv kunna generera Vector Tiles utifrån mina egna drygt 200 geodatalager, som jag brukar använda för mitt utvecklingsarbete kring webbkartografi. Servern står hos en av mina söner i Stockholm och är inte alltför lätt att fjärr-administrera och min tanke var att ha två parallella installationer av GeoServer.

Nu återberättar jag istället information jag inhämtat från andra som testat Vector Tiles.

I första redovisningen av **sisTK570-webbkartografi** (WMS) skrev vi:

- Webbkarttjänster gör det möjligt för en aktör att **kombinera kartskikt** till en webbkarta, trots att dessa har producerats oberoende av varandra av olika myndigheter och andra organisationer.

- Rapporten (<http://www.sis.se/PageFiles/12181/TK%20570%20Rapport%201.0%20Webbkartografi.pdf>) handlar om hur man bör konstruera en webbkarttjänst så att **dess kartskikt blir så användbara som möjligt när de kombineras med kartskikt från andra webbkarttjänster**.

- Den allt övergripande riktlinjen är att webbkarttjänster bör **erbjuda alternativa kartskikt** på ett sätt som underlättar arbetet med att välja och kombinera lämpliga kartskikt **så att läsbara och begripliga webbkartor uppstår**.

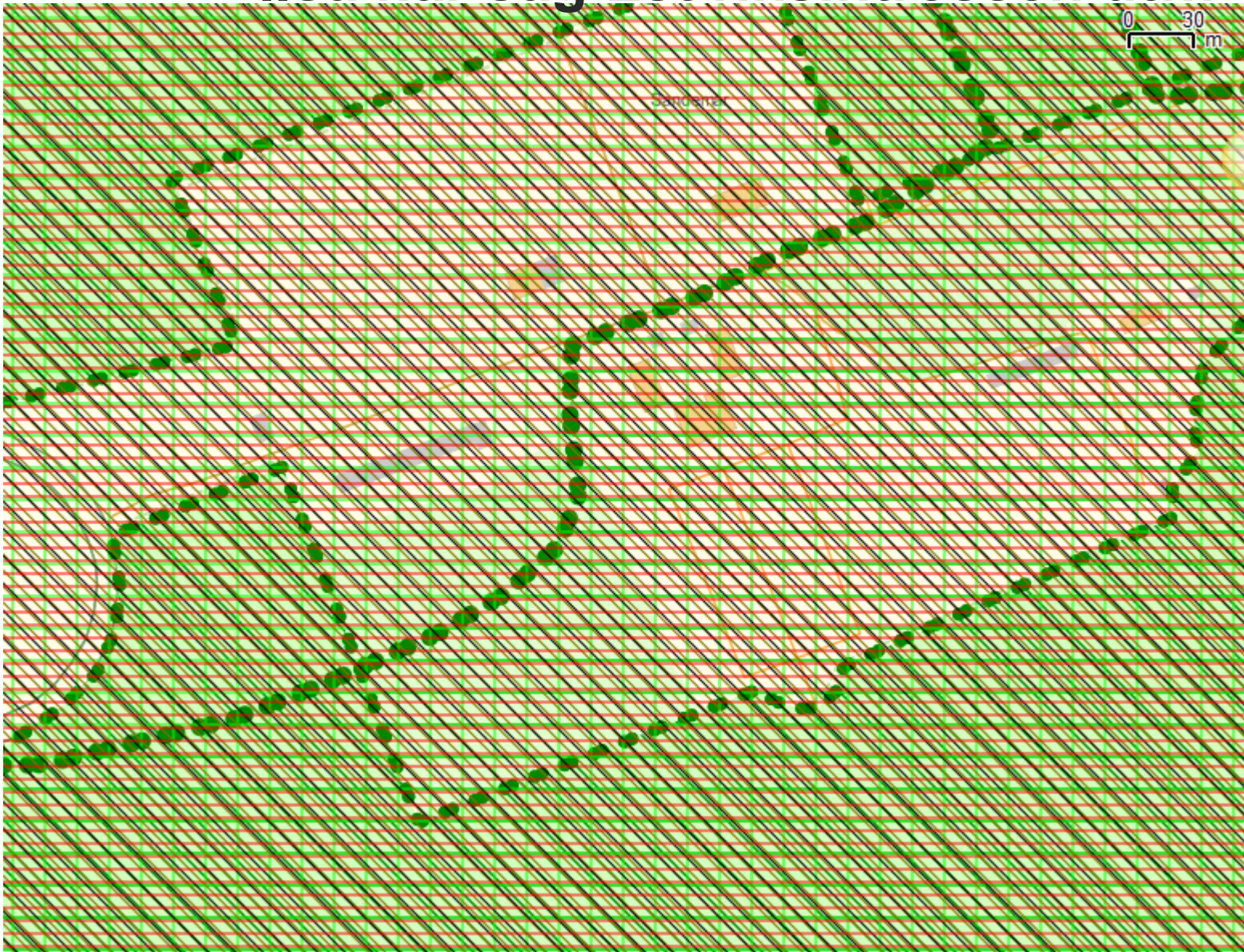
Allt detta på grund av att **WMS-tjänster är serverbaserade** och därmed sker bearbetning till en läsbar kartbild på server.

**Vector Tiles överlämnar detta med kartmanér helt till klienterna!**

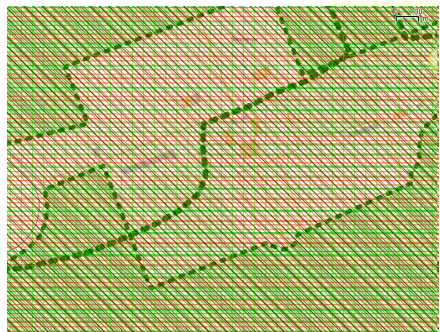


# Tillbakablick

## ..så här såg Lst riksintressen ut...







Västerhaninge,  
Sandemar  
Metria Maps  
Fastighet i  
bakgrunden

6 st. Riksintressen  
Ursprunglig skärm-  
skala 1:1 600 i QGIS.

Bild 100%

# Vector Tiles From Wikipedia, the free encyclopedia

[https://en.wikipedia.org/wiki/Vector\\_tiles](https://en.wikipedia.org/wiki/Vector_tiles)

Vector tiles, tiled vectors or vectiles are packets of **geographic data, packaged into pre-defined roughly-square shaped "tiles" for transfer over the web.** This is an emerging (AnS: 1966) method for delivering styled web maps, combining certain benefits of pre-rendered raster map tiles with vector map data. As with the widely used raster tiled web maps, map data is requested by a client as a set of "tiles" corresponding to square areas of land of a pre-defined size and location. Unlike raster tiled web maps, however, **the server returns vector map data**, which has been clipped to the boundaries of each tile, instead of a pre-rendered map image.

There are **several major advantages** of this hybrid approach. Compared to an un-tiled vector map, the **data transfer is reduced**, because only data within the **current viewport**, and at the **current zoom level** needs to be transferred. The GIS clipping operations can all be performed in advance, as the tile boundaries are pre-defined. This in turn means that tiled vector data can be packaged up and distributed, without needing any kind of GIS system available to serve data. Compared to a tiled raster map, data transfer is also greatly reduced, as vector data is typically much smaller than a rendered bitmap. Also, styling can be applied later in the process, or even in the browser itself, allowing **much greater flexibility in how data is presented.** It is also easy to **provide interactivity with map features, as their vector representation already exists within the client.** Yet another benefit is that **less centralised server processing power is required**, since rasterisation can be performed directly in the client. This has been described as making "rendering ... a last-mile problem, with fast, high-quality GPU[s] in everyone's pocket".

Vector tiles are a way to **deliver geographic data in small chunks to a browser or other client app**. Vector tiles are **similar to raster tiles** but instead of raster images the data returned is a vector representation of the features in the tile. For example a **GeoJSON** vector tile might include **roads as LineStrings** and bodies of **water as Polygons**. Some vector tile sources are clipped so that all geometry is bounded in the tiles, potentially chopping features in half. Other vector tile sources serve unclipped geometry so that a whole lake may be returned even if only a small part of it intersects the tile.

There are currently several experimental projects serving vector tiles from **OpenStreetMap data**.

- The **Mapnik Vector Tiles** are one source of OSM vector tiles in **GeoJSON format**. (Hela världen – 54GB)
- The OpenStreetMap API can also be used as an ad-hoc vector tile source for OSM XML data by creating appropriate bounding box queries; the iD editor uses this mechanism to access OSM source data.



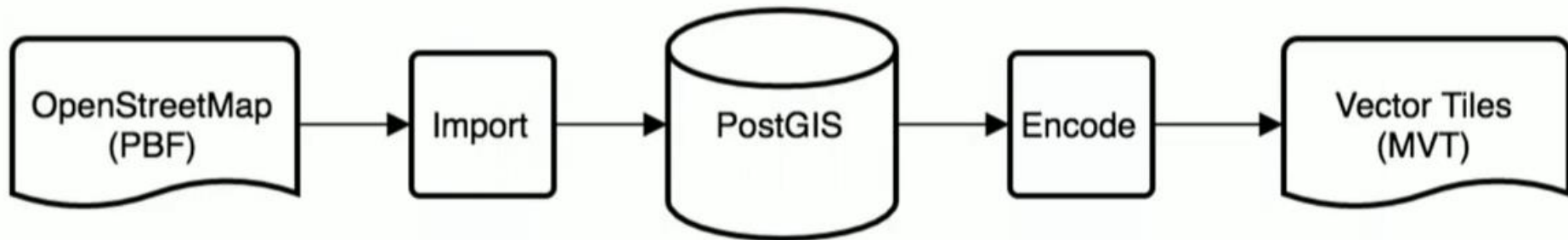
# Free Vector Tiles from OSM

## OSM2VectorTiles

<http://osm2vectortiles.org/>

## How to turn OSM into Vector Tiles?

- Import OSM data into database (osm2pgsql, imposm)
- Spatial database to integrate, preprocess, query (PostGIS)
- Encode a query for each tile as vector tile (Mapnik)



# En server ajourhåller Vector Tiles from OpenStreetMap

## Keep vector tiles up to date

- Detect changed features
- Find minimal set of tiles covering these features
- Only render changed tiles
- Merge back into planet
- Single machine can keep OSM up to date



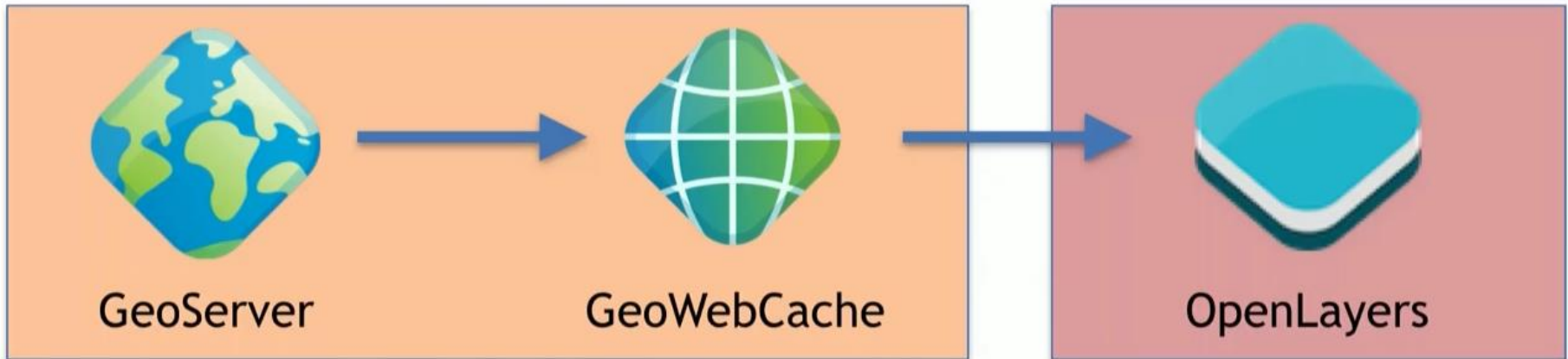
GeoServer erbjuder tre olika  
Vector Tile format redan idag!

application/json;type=geojson

application/json;type=topojson

application/x-protobuf;type=mapbox-vector

## Outline of this talk



- 5 seconds to turn on Vector Tiles
- Vector Tiles in the OGC context
- Geoserver Rendering Process
- SLD to control Vector Tile Generation

- OpenLayers Overview
- Vector Tile Maps
- Styling
- Advanced user interaction
- Demo

...&SERVICE=WMS&REQUEST=GetMap&FORMAT=application/x-protobuf;type=mapbox-vector

# .shp → Vector Tiles ...om du vill tillverka egna VT...

The screenshot shows the Mapbox Studio Classic interface. The main map area displays a dark-themed map of Zurich, Switzerland, with a white '2' in a box. The right-hand panel shows the configuration for a layer named 'zurich\_switzerland\_osm\_admin'. The 'Shapefile' field contains the path: '/Users/lukasmartinelli/Projects/geometalab/foss4g/zurich\_switzerla'. The 'Projection' field contains: '+proj=longlat +ellps=WGS84 +datum=WGS84 +no\_defs'. Below this is a 'Buffer size' slider and a 'Browse files' dialog box. The 'Browse files' dialog shows a list of shapefiles, with 'zurich\_switzerland\_osm\_admin.shp' selected. A white '1' is in a box next to this selection. Below the file list is a 'Select' button. In the bottom-left corner, a 'Settings' panel is open, showing 'Map ID Source not uploaded' and an 'Upload to Mapbox' button. A white '4' is in a box next to this button. In the bottom-center, a metadata editor for the selected layer is open, showing fields like 'admin\_level', 'id', 'name', 'osm\_id', and 'type'. A white '3' is in a box next to this editor.



# VectorTiles zoom in KLOKANtech 94s ans1161024



<https://maps.klokantech.com/> <https://youtu.be/n1vhzmqgsJc>

## Klokantech Maps

The world maps from Klokantech Technologies GmbH are powered by vector tiles, with fallback to raster tiles for old clients.

We use our open-source TileServer-GL software to render these maps from OpenMap styles, fonts and OSM data.

Data is organized into 9 layers:

**boundaries, buildings, earth, landuse, places, POIs, roads, transit and water**

Like chapters in a book, we reveal data through **18 different map zooms**. Zoom 0 fits the world onto your smartphone screen while panning into zoom 18 reveals neighbourhood streets, buildings, and businesses.

We've spent an insane amount of time orchestrating **when each of those 600+ features come in and out of view**, how prominent each is, and we've sourced quality data for each role.



# VectorTiles zoom in MAPZEN 66s ans1161024



<https://mapzen.com/blog/v1-vector-tile-service/>

<https://youtu.be/lrndRRnLQBI>

Mapzen offers several **different types of tiles in vector** and raster **formats** and we **combine data from multiple sources**.

## GeoJSON:

[http://tile.mapzen.com/mapzen/vector/v1/all/{z}/{x}/{y}.json?api\\_key=mapzen-xxxxxxx](http://tile.mapzen.com/mapzen/vector/v1/all/{z}/{x}/{y}.json?api_key=mapzen-xxxxxxx) (api\_key: Kostnadsfritt för utveckl./test)

## TopoJSON:

[http://tile.mapzen.com/mapzen/vector/v1/all/{z}/{x}/{y}.topojson?api\\_key=mapzen-xxxxxxx](http://tile.mapzen.com/mapzen/vector/v1/all/{z}/{x}/{y}.topojson?api_key=mapzen-xxxxxxx)

## Mapbox Vector Tile:

[http://tile.mapzen.com/mapzen/vector/v1/all/{z}/{x}/{y}.mvt?api\\_key=mapzen-xxxxxxx](http://tile.mapzen.com/mapzen/vector/v1/all/{z}/{x}/{y}.mvt?api_key=mapzen-xxxxxxx)

...Oooops! Whoooooow! Första svaret.

GeoJSON:

OK inte "Välj alla"

[http://tile.mapzen.com/mapzen/vector/v1/all/16/19293/24641.json?api\\_key=mapzen-ATCDnha](http://tile.mapzen.com/mapzen/vector/v1/all/16/19293/24641.json?api_key=mapzen-ATCDnha)

- 24641 boundaries
- 24641 buildings Point
- 24641 buildings Polygon
- 24641 earth
- 24641 landuse LineString
- 24641 landuse Polygon
- 24641 places
- 24641 pois
- 24641 roads
- 24641 transit
- 24641 water Point
- 24641 water LineString
- 24641 water Polygon

Välj vektorlager att lägga till...

Lager-ID	Lagernamn	Antal objekt	Geometrityp
5	boundaries	0	Unknown
1	buildings	47	Point
1	buildings	121	Polygon
7	earth	1	Polygon
8	landuse	1	LineString
8	landuse	6	Polygon
2	places	0	Unknown
4	pois	21	Point
6	roads	111	LineString
3	transit	0	Unknown
0	water	1	Point
0	water	2	LineString
0	water	2	Polygon

"Zoom to layer" roads

OK Välj alla Avbryt

- 24641 landuse LineString
- 24641 landuse Polygon
- 24641 buildings Polygon
- 24641 water Point
- 24641 water LineString
- 24641 water Polygon
- 24641 earth

[http://tile.mapzen.com/mapzen/vector/v1/all/16/19293/24641.json?api\\_key=mapzen-ATCDnha&layerid=8&geometrytype=Polygon](http://tile.mapzen.com/mapzen/vector/v1/all/16/19293/24641.json?api_key=mapzen-ATCDnha&layerid=8&geometrytype=Polygon)

# MapBox Studio test

<https://www.mapbox.com/studio/tilesets/anderssoderman.2qn49xoz/>

Jag har ett Starter-konto =>

**vectortiles\_osm\_ans161025\_swe-dof6u6**

Uploading  
vectortiles\_osm\_ans161025\_sweden.mbtiles  
91%

161025 0845  
Sedan 15 min laddas hela Sverige, 1.3GB

STARTER	PREMIUM	ENTERPRISE
\$ <b>0</b> / mo	\$ <b>499</b> / mo	<b>CONTACT US</b>
50,000 map views / mo, or 50,000 mobile users / mo	1,000,000 map views / mo, or 200,000 mobile users / mo	5,000,000+ map views / mo, or 200,000+ mobile users / mo
Current plan	Upgrade	Contact us

Processing  
vectortiles\_osm\_ans161025\_swe-dof6u6  
anderssoderman.2qn49xoz

still proce.. 0850  
...loading...

Loading  
vectortiles\_osm\_ans161025\_swe-dof6u6  
anderssoderman.2qn49xoz

Bounds  
10.5,55.0,  
24.3,69.2



STARTER	PREMIUM	ENTERPRISE
Public & free websites, mobile apps	Public & free websites, mobile apps	Public & free websites, mobile apps
<a href="#">Commercial apps</a>	Commercial apps (up to 250 seats)	Commercial apps (over 250 seats)
<a href="#">SLA</a>	SLA	Enterprise SLA
<a href="#">Priority email support</a>	Priority email support	Dedicated point of contact
<a href="#">Paid apps</a>	Paid apps	Paid apps
<a href="#">Asset tracking</a>	Asset tracking (up to 1,000 assets)	Asset tracking (over 1,000 assets)
<a href="#">Private encrypted maps</a>	Private encrypted maps	Private encrypted maps
<a href="#">Whitelabeled maps</a>	1 tileset	1.2 GB of 5.0 GB used Refresh Upgrade Plan
<a href="#">On-premise installation</a>	<b>vectortiles_osm_ans161025_swe-dof6u6</b> 1.2 GB Modified a few seconds ago	<a href="#">View</a> <a href="#">Menu</a>
600 geocode requests/minute	600 geocode requests/minute	2,400+ geocode requests/minute
5 GB tileset storage	50 GB tileset storage	Sky's the limit
250 MB dataset storage	5 GB dataset storage	Sky's the limit
20 Mapbox Studio styles	30 Mapbox Studio styles	50+ Mapbox Studio styles

<https://docs.google.com/spreadsheets/d/1kCe8K-2HW6Z-2Nw2fuk0pXFVQYdn6PAGv8Z7jrdbNbc/edit#gid=1328414565>

<http://osm2vectortiles.org/downloads/>

<https://www.mapbox.com/studio/tilesets/>

<https://www.mapbox.com/studio/tilesets/anderssoderman.2qn49xoz/>

<https://www.mapbox.com/studio/styles/anderssoderman/ciup63gmo00k82hpb5fga7vcj/edit/?fullscreen=true>

granitoid [http://www.gisassistans.se/sistk570\\_sgu\\_sld\\_www.geodata.se\\_ans161011\\_1630.html](http://www.gisassistans.se/sistk570_sgu_sld_www.geodata.se_ans161011_1630.html)

inspire bornsjon2k  
inzoom mm orto  
carmenta ans140613  
1857 rawcopy

→ <https://www.youtube.com/watch?v=egWc7xOh0hw&feature=youtu.be>

<http://www.gisassistans.se:8080/geoserver/web/>

<http://www.gisassistans.se/webbkartografi.html>

<https://geoportal.bayern.de/getcapabilities/>

<https://mapzen.com/blog/v1-vector-tile-service/>

Vector Tiles Part 3 <https://www.youtube.com/watch?v=6nLZVdbmSYw>

SLDer <https://docs.google.com/spreadsheets/d/1elart38e01Z0egMVhnKANdQynl4->

WMSer <ecRMUJiHgXQD3PI/edit#gid=14>

<https://docs.google.com/spreadsheets/d/15xhXE6HfWNMiCHX3NnCNV0A9ftqII5W1JmF6Iq7-5gE/edit#gid=242099925>

<http://yz.uli.se/> ♦ <https://prezi.com/dashboard/#>

<https://dudle.inf.tu-dresden.de/samgisz2016-SemiOkt/>

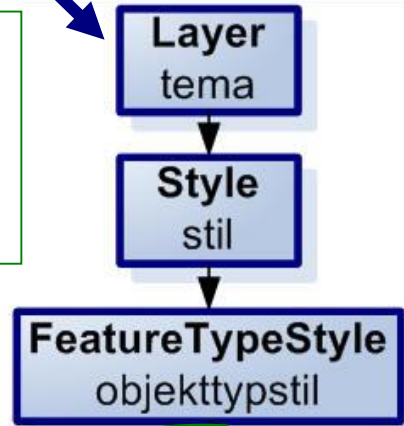


```
<Layer queryable="1">
  <Name>berg: SE.GOV.SGU.ALDER.1M</Name>
  <Title>Bergets ålder, isotopanalyser</Title>
  <Abstract>aldr alder</Abstract>
```

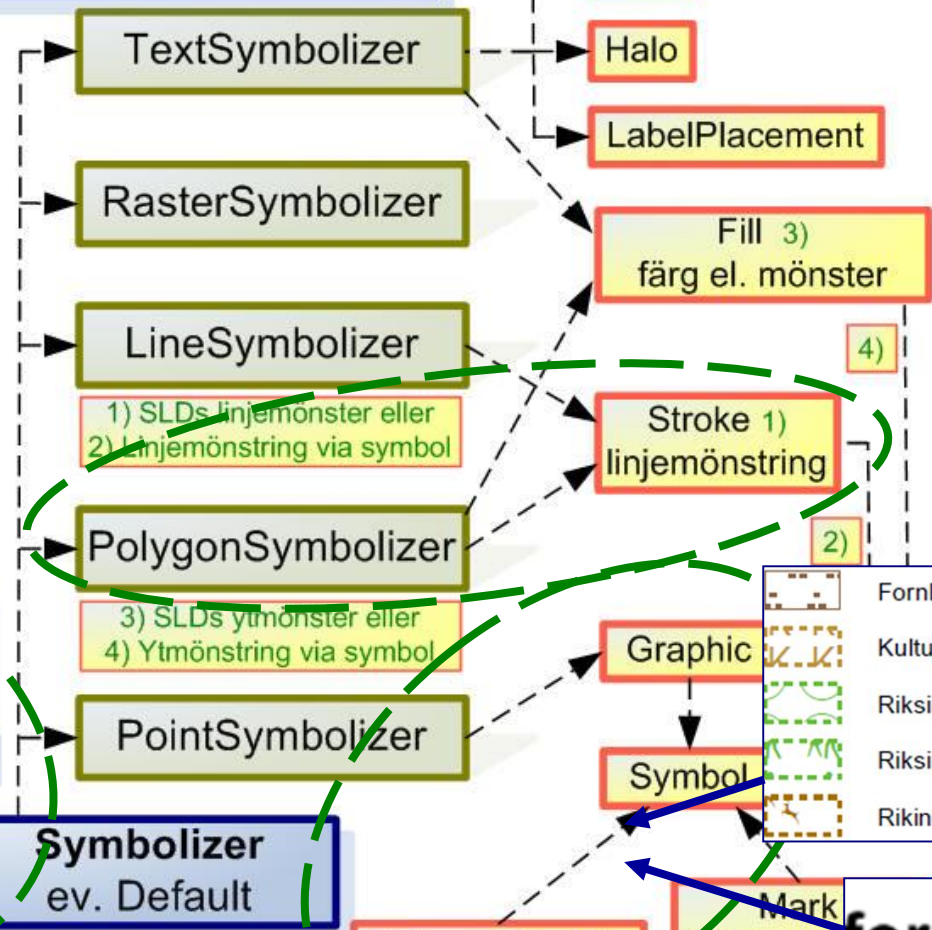
Named Layer

# SLD 1.0.0

Viktigt i: SLD-enabled WMS



1st:Filter 2:Scale 3:Symbolizer



- Fornlämning
- Kulturresevat
- Riksintresse kust-turism
- Riksintresse friluftsliv
- Rikintresse rennärning





# Jag har en dröm ...

- Ett stort antal tema-baserade WMS-tjänster (skolval, strandskydd, dammbrott, ...) erbjuds svenska användare/handläggare.
- Dessa WMS-tjänster är "paketerade", d.v.s. WMS-tjänster, som hämtar geodata online direkt från källan via WFS-/WMS-tjänster. Användare/handläggare når det de behöver via **ett** GetMap-anrop!
- Dessa WMS tjänster är "SLD enabled WMS", d.v.s. att jag vid behov kan påverka de olika geodatalagrens kartmanér, om mina användare kräver det.
  - Information finns om ingående attribut m.m. (DescribeLayer etc.)
- Sverige (Norden) erbjuder
  - ett rikt utbud av överenskomna kartsymboler med regler för när symbolerna bör användas.
  - ett urval av "start-SLDer" som kan användas för att förändra olika kartmanér hos punkter, linjer och ytskikt/polygoner.

