

Mapping of public transportation within the Cities of COM'ON



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1 Introduction

This report is a screening of the public transportation in the different represented Metropolis of the COM'ON project. The main focus has been to get familiar with the digital accessibility of data and information from the respective public transportation systems. The summary and conclusions from this report are based from a pure technical view.

In this report we divide public transport data into static data and dynamic/live data. Static is all data that will not change through a daily basis, such as bus plans, routes and location of stops. Live data are volatile information that needs to be accessed frequently, such as tram position, velocity, delay or cancelation. Furthermore we need also to differentiate if these API's covers journey planner functionality. That is if the API itself calculates a route for you, upon a set of criteria's, or you need to do this by yourself.

The order of City is alphabetically and has nothing to do with priorities.

2 Barcelona

2.1 Barcelona public transportation systems

This report covers the public transportation systems in Barcelona area.

Transports Metropolitans de Barcelona (TMB) is the main public transit operator in Barcelona, made up of two formerly separate companies, Ferrocarril Metropolità de Barcelona, SA. and Transports de Barcelona, SA.. It runs most of the metro and local bus lines in Barcelona and the metropolitan area.

The bus network serves Barcelona and the metropolitan area through 109 lines that cover a total distance of 920.62 kilometres. The Barcelona Metro service has 123 stations. It is formed by six lines and a funicular railway. In 2008, TMB carried 572.39 million passengers. It has 7,707 employees.

There is also an authority in Barcelona that seeks to coordinate and integrate other public transport companies (such as TramMet (<http://en.wikipedia.org/wiki/TRAMMET>), for the local trams) into the same network, ATM (Autoritat del Transport Metropolità).

Autoritat del Transport Metropolità (Metropolitan Transportation Authority), shortened as ATM, is the organization in charge of the coordination of several public transportation systems in the city of Barcelona, its metropolitan area and other regions under its influence, including the setting of a shared fare, as well as the management, planning and/or construction of infrastructure for the global network.

2.1.1 TMB

www.tmb.cat/en/home

TMB is a very well expanded transportation organisation which publishes a broad range of technology services.

- The TMB iBus system tells you how long before a bus gets to the stop, on your phone, mobile device or Internet.
- User information screens at bus stops tell how many minutes wait you have before the bus arrives and also informs of any service disruptions.

- The passenger information service on board buses tells you which is the next stop, both on screen and by message announcement.
- The metro passenger information service, on screens on the platform, in lobbies and entrances, tell you how long before the next train and also informs of any service disruptions.
- MouTV is TMB's new information, service and entertainment channel being installed on platforms and trains and on some bus lines.
- TMB augmented reality applications for mobiles, such as TMB Virtual, provide information on the bus and metro services when and where you need it.
- TMB offer a version of our website for mobile phones and devices with the main search functions found on the website: map query, the Going to journey planner, the Where am I? transport locator, bus waiting time query via the TMB iBus service and all the information necessary for getting about. www.tmb.cat/mobile
- Through QR code technology we provide rapid access to information on the TMB bus network. QR codes are labels, in this case attached to bus stops, that contain data (like barcodes, only they are two-dimensional) and can be read by mobile phone cameras. On reading the code, the phone automatically opens a browser page containing information on the buses that stop there, when the next buses are due and any alterations to services.

2.1.2 Digital Signage

Real-time access to service information makes travel easier and more engaging for subways and bus users.

Objectives

- Improve customers service information: Deliver real-time, location based information, such as subway/bus arrival times, delays or service stoppage.
- Add non-travel-related value: Provide general information: news clips, sports, culture, events and weather.
- Become a leader in technology/innovation: Developing a leading edge information distribution system that reflects most favourably on Barcelona.
- Enable advertising revenue: Design the system to allow advertising partners to play advertising (20 sec. Video clip), thereby creating a new revenue source.
<http://www.intel.com/content/www/us/en/embedded-developers-engineers/transportation-tmb-case-study.html>

2.2 Public API

Currently i2Cat is in negotiation with TMB for obtaining their transportation API. We have been informed that it is only static data that they support in their public API.

2.2.1 Traffic Service of Barcelona

<http://data.opencities.net/dataset/1324321948512000>

This service shows information about the traffic status of Barcelona. The OpenData file collects in the value field all the information regarding to the stations using a JSON format. The value entries are following this scheme:

```
{"id": "1", "name": "Diagonal (Ronda de Dalt a Doctor Marañón)", "latitude": "41.3841912394771, 41.381630792122", "longitude": "2.11203535639414, 2.10150286288105", "status": "0", "next_status": "0", "date": "20111219182615"}
```

The properties are: -id: section identifier -name: name of the streets of the section -latitude: geoposition. Note: a traffic section is not a single point. -longitude: geoposition. Note: a traffic section is not a single point. -status: traffic status following these codes: (0 Molt fluid, 1 Fluid, 2 Dens, 3 Molt dens, 4 Congestio, 5 Sense dades, 6 Tallat) -next_status: traffic status stimation for the next 15 min. - date: date when the data was collected.

2.2.2 Barcelona Bus Stations

<http://data.opencities.net/dataset/1324402003613000>

Location of the Barcelona bus stations. It provides the station id and the lines that pass there. This API is licensed

2.2.3 Barcelona Metro Stations

<http://data.opencities.net/dataset/1324402197153000>

Location of the Barcelona metro stations. It provides the station id and the lines that pass.

2.2.4 Barcelona Taxi Stations

<http://data.opencities.net/dataset/1324402307640000>

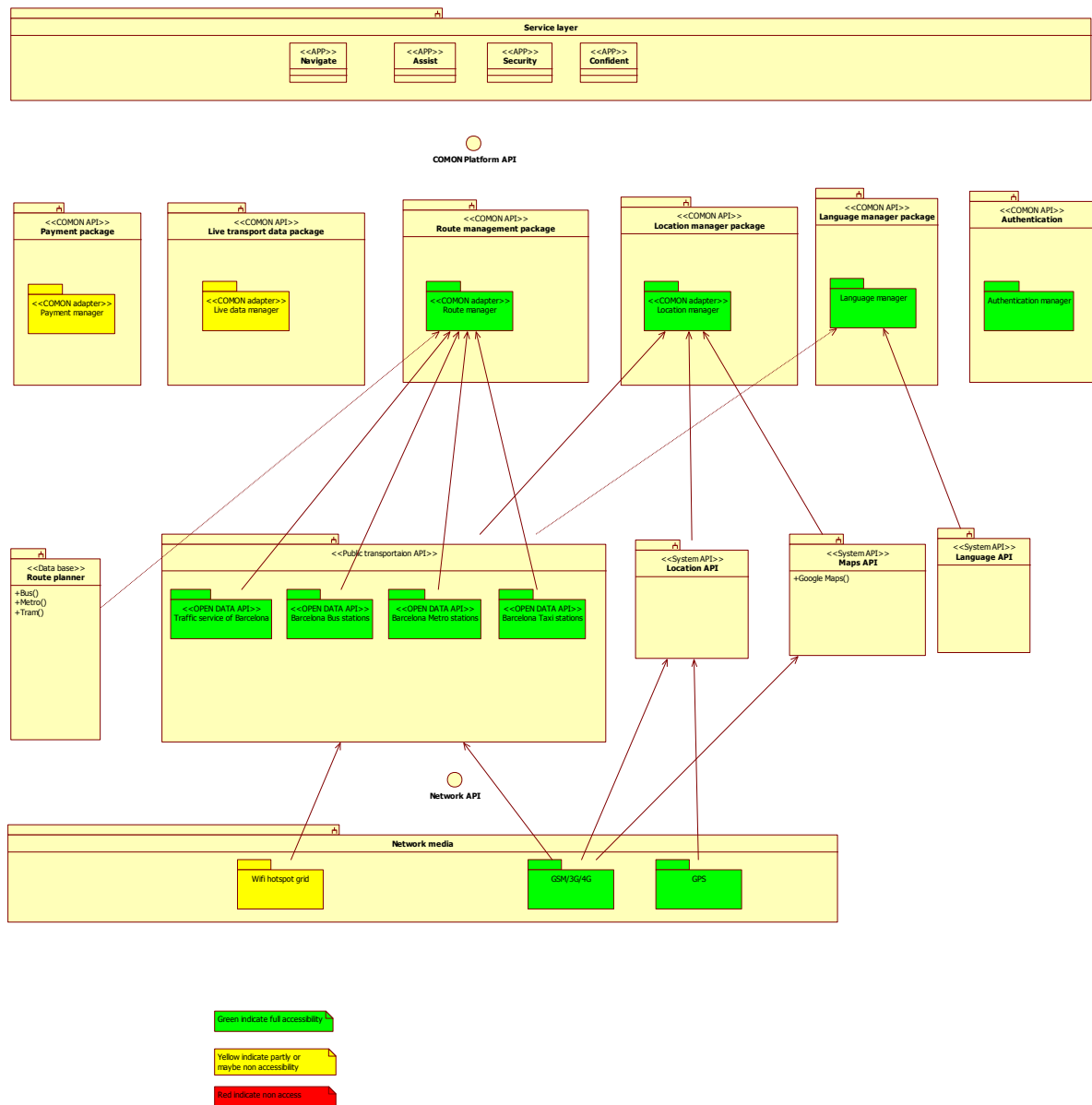
Location of the Barcelona taxi stations. It provides the station id and the location.

2.2.5 API's in general

All these API's are based on OPEN DATA

<http://opendefinition.org/okd/>

2.3 Architecture API overview for Barcelona



2.4 Summary Barcelona

The main transit operator in Barcelona is TMB which covers most of the public transportation in Barcelona area. TMB offers the traveler of Barcelona a wide range of passenger information services, which gives more confident when travelling with public transportation.



COM'ON is currently in a dialog with TMB and ATM for obtaining their open API. Open City group offers some open API which can be used right away, the problem they are not maintained.

3 *Helsinki*

3.1 Finland National transportation systems

This report covers the public transportation systems in Helsinki area. Two Transportation organizations are represented in Helsinki, FTA and HSL.

3.1.1 Finnish Transport Agency (FTA)

The **Finnish Transport Agency** is responsible for the maintenance of Finland's transport system. The Agency took over from the Finnish Rail Administration and parts of the work of the former Finnish Maritime Administration and the Finnish Road Administration on January 1, 2010.

The Finnish Transport Agency is a government agency operating under the Ministry of Transport and Communications, and it is responsible for maintaining and developing the standard of service in the transport system's traffic lanes overseen by the government.

<http://portal.liikennevirasto.fi/sivu/www/e/>

Journey planner by FTA

Journey.fi provides information on rail and bus connections, ferries and walking routes in Finland. The service also includes local transport connections for 21 cities. Journey.fi has been developed to be used by a PC via the Internet. You can choose for the service to find and suggest routes that are the fastest, or ones with as few transfers as possible. The total travel times include the time spent walking.

The service includes bus, train and local traffic schedules and available route alternatives for the following regions and operators:

- The Greater Helsinki area: Helsinki, Espoo, Kauniainen, Vantaa, Kerava, Kirkkonummi
- The cities of Turku and Oulu with their surrounding areas
- Tampere, Joensuu, Kotka, Lappeenranta, Mikkeli, Jyväskylä, Lahti, Kuopio, Hyvinkää, Hämeenlinna, Imatra, Pori, Seinäjoki, Varkaus
- Trains operated by VR

3.1.2 Helsinki Regional Transport Authority (HSL)

Helsinki Regional Transport Authority began its work on January 1, 2010. The work of the new inter-communal authority is based on the new Finnish public transportation law in force since December 3, 2009. HSL is one of the largest inter-communal bodies in Finland, having 1.1 million people in its area of influence.

According to the law HSL is responsible for the planning and procuring of the public transportation in the Helsinki region. The traffic functions of YTV (Helsinki Metropolitan Area Council) and planning, procuring and tendering functions of HKL (Helsinki City Transport) were moved into the transport authority.

It is now HSL's duty to procure the bus, tram, metro, ferry and commuter train services and to compile the Helsinki Region Transport System Plan. HSL also takes care of marketing and passenger





information for the public transportation, approves the fare and ticketing system and the tickets' prices and is responsible for ticket inspection.

- Member municipalities: Helsinki, Espoo, Vantaa, Kauniainen, Kerava, Kirkkonummi and Sipoo
- Responsible for planning and organization of public transport in the region, improving operating conditions for public transport, procurement of bus, tram, metro, ferry and commuter train services and preparation of the Helsinki Region Transport System
- HSL is also responsible for public transport marketing, passenger information and ticket inspection and approves the fare and ticketing systems as well as ticket prices.

COM'ON Advisory Board Member & our national board member: Project Manager Jari Honkonen (Department of Passenger Services)

HSL: www.hsl.fi/en/

Payment: http://www.vr.fi/en/index/junaliput/lippujen_ostopaikat/verkkokauppa.html

Journey planner: <http://www.hsl.fi/en/Pages/default.aspx> - <http://www.reittiopas.fi/en/>

3.2 Public API

Two public transportation API's are available for acquiring live data; Reittiopas API and Mattersoft live API.

3.2.1 Reittiopas API Developer's Guide

<http://developer.reittiopas.fi/pages/en/home.php>

Helsinki Regional Transport Authority (HSL) offers access right to Reittiopas (Journey Planner) interface, when application or service supports public transport usage and transport information availability. There are two possible way to access timetable and route data:

- HTTP GET interface, which gives a response in XML format<
- Kalkati.net formatted XML database dump file, which include the whole information in a single file

Use of interfaces is free of charge. Distribution and re-use of HSL information is allowed. Due limited service capacity, queries of one account are limited to max. 5000 weighted query in one hour. Documentation is available only in English and HSL takes no responsibility of possible errors or damages caused by documentation. If you find an error or have an idea how to improve documentation, please tell it us with the contact form.

Access to interface is asked with account request form or if you need more information, please use contact form. HSL reserves a right to inspect applications and services before granting access rights to the interface. HSL has justice to abolish access right whenever it is necessary, for example in case of excessive traffic to interface or misuse of the service.

NOTE: HTTP Get interface, version 2 is in production. See left hand navigation for new instructions.

<http://developer.reittiopas.fi/pages/en/http-get-interface.php>

3.2.2 Mattersoft Live API

Mattersoft Ltd is a Finnish high-technology company which main business is software production and related services. The company has become a significant system provider in the field of intelligent





transport systems in Finland. Company specializes on public transport information control and traffic light priorities. Other areas of expertise are e.g. demand-responsive transport, parking control, fleet management and logistics.

<http://www.mattersoft.fi/>

Real-Time Public Transport Information System

Mattersoft Live! is a modern and cost-effective solution for gathering, analyzing and processing real-time traffic data. Due to its flexibility and performance, Live! is well applicable for different types of needs regardless of the fleet size.

The passengers can be provided with an on-board Wi-Fi connection, which can be used with e.g. laptop or a mobile phone. With Wi-Fi connection, passengers are provided real-time information about the line they are on and get the estimated times of arrival directly on their mobile device. Live also enables other types of location based information to be distributed on-board. These include e.g. voice announcements of upcoming stops, advertisements, weather forecasts and other information that is seen relevant for their journey

Services used in Helsinki Region:

- Real-time information
- Free Passenger Wi-Fi
- Internet- and mobile services
- On-board voice announcements
- Traffic light priorities

Real-Time Passenger Information

Live! can use various technologies for presenting real-time passenger information on stops, in vehicles and on the internet. The possibility to use data from external systems and the use of open technologies make the system very cost-effective and scalable for both, public transport operators and authorities

Traffic Light Priorities

The centralized architecture of Live! enables the modification of traffic light priorities in real-time, without the need of modifying or updating the vehicle units one by one. The modification of the priorities is done quickly and easily on a web-based map interface in any location with internet connection.

In-vehicle Passenger Services

An on-board Wi-Fi connection for the passengers can be provided. Variety of information can be shown on-board, even based on the location or time of day. This information can include e.g. route information, advertisements, weather information or other types of information related to the trip.

Mattersoft live API

There are two types of interfaces: a push-interface for socket connections and a http-request interface.



- Push-interface is used to send data to the customers, who are connected to the interface through socket-connection. It is possible to feed different parameters to limit the data sent by the interface.
- The Request interface serves i.e. internet-pages that collect information from Mattersoft Live!system. Data transfer of the interface is based on http-request.

Mattersoft live API is retrieving live data and info regarding transport vehicles and stops. But this API doesn't deliver any journey planner functionality.

3.3 Service Platforms for greater Helsinki region

3.3.1 Service Map of the Greater Helsinki Region

- Public service points on the map; info on accessibility, service point details.
- "Service for the elderly" includes private service providers
- Computer & internet & wlan; Tourism and events
- Link to Journey Planner
- Link to feedback; latest feedback messages are shown
- Helsinki, Espoo, Vantaa and Kauniainen

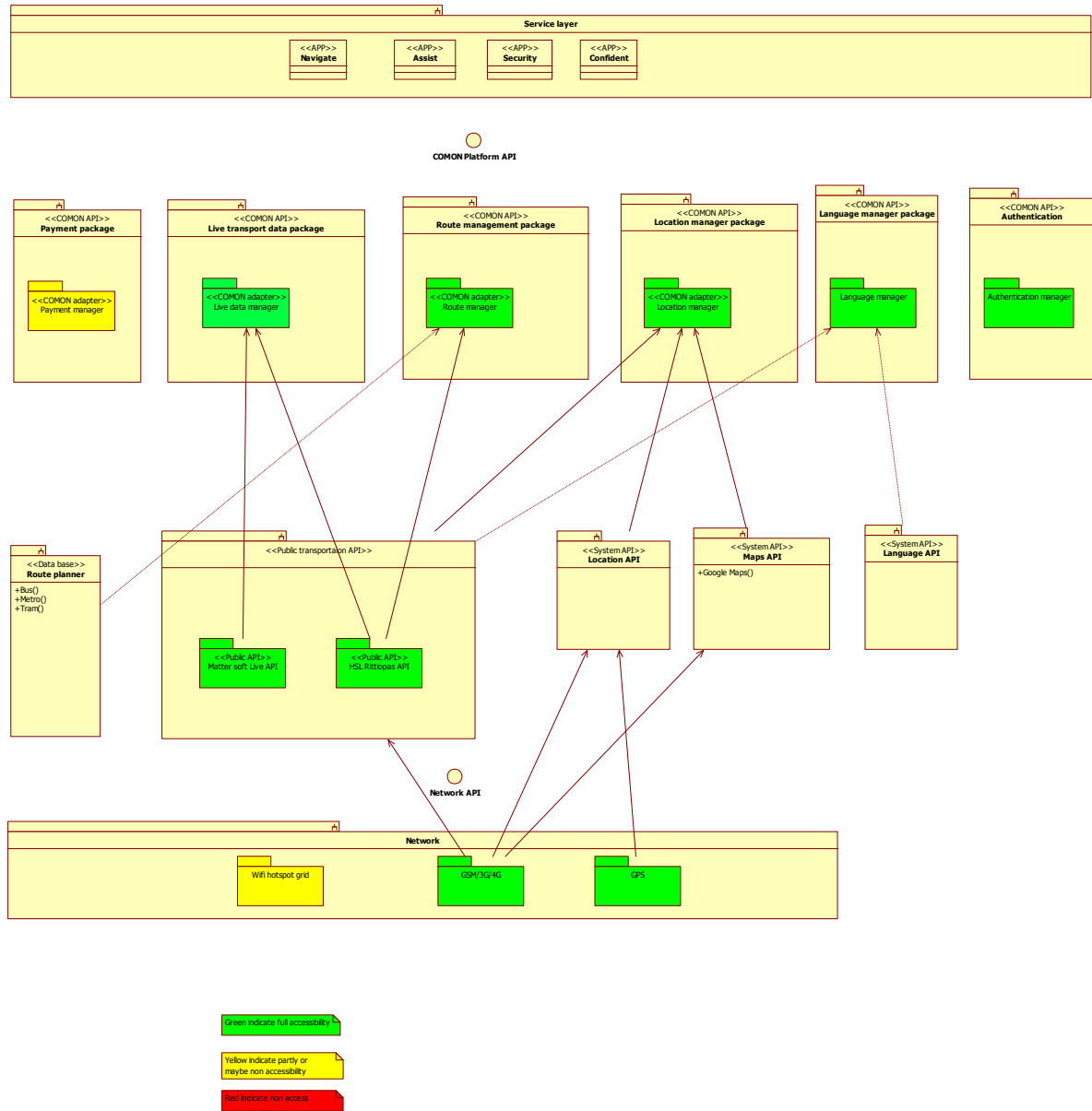
<http://www.hel.fi/palvelukartta/Default.aspx?language=en&city=-1>

3.3.2 Service warning for slippery conditions

Text message service offered by a private company; covers six cities. To join in, send a text message "Warning Helsinki 8"

<http://www.liukastumisvaroitus.fi/etusivu.html>

3.4 Architecture API overview for Helsinki



3.5 Summary Helsinki

Helsinki is covered by two transportation organizations, the national FTL and the Helsinki region HSL. HSL offers the Reittopas API Developer's Guide which covers live data for the all public transportation in Helsinki. Additionally a private company Mattersoft provides a similar transportation API which also provides live data. Both are candidates for using, but only Reittopas offers the timetables for the different transportations systems and companies. The drawback of Reittopas on the other hand is



.....
limited service capacity, and therefore queries of one account are limited to max. 5000 weighted query in one hour. Mattersoft do not offer journey planner functionality unlike Reittiopas API.



4 *Brussel and Antwerpen*

4.1 **Belgiums public transportation systems**

Belgium has an excellent public transport network which is cheap and efficient. One of its strengths is its integrated train, tram, metro and bus system (at least in some of the big cities) which makes it easy to make connections. The country is divided into 4 different regions:

History: Brussels has grown from a 10th-century fortress town founded by a descendant of Charlemagne into a metropolis of more than one million inhabitants. The metropolitan area has a population of over 1.8 million, making it the largest in Belgium. It is also the largest urban area in Belgium, comprising 19 municipalities, including the municipality of the City of Brussels, which is the capital of Belgium, in addition to the seat of the French Community of Belgium and of the Flemish Community.[9]

4.1.1 **Federal Public Service Mobility and Transport Agency (FPS)**

FPS: <http://www.mobiliteit.fgov.be>

There is one national public company who controls the main part of the transport sector in Belgium, but there are more companies that provide transport services to different regions:

- National Rail transport — SNCB/NMBS (company) — Vicinal tramway (abandoned)
- Flanders De Lijn (company) — Antwerp Tram — Antwerp Pre-metro — Ghent Tram — Coast Tram
- Wallonia Société Régionale Wallonne du Transport — TEC — Charleroi Metro
- Brussels STIB/MIVB (company) — Brussels Metro — Brussels trams — Brussels buses

4.1.2 **NMBS/SNCB**

SNCB: <http://www.b-rail.be/main/E/index.php>

NMBS/SNCB is the National Railway Company of Belgium. They control the railway systems of Belgium in collaboration with De Lijn.

History: It was created in 1926. The NMBS/SNCB is an autonomous government company. In 2005, the company was split up into three parts: Infrabel, which manages the railway infrastructure, network operations and network access, the public railway operator SNCB itself to manage the freight (B-Cargo) and passenger services, and NMBS/SNCB-Holding, which owns both public companies and supervises the collaboration between them. In February 2011, SNCB Logistics began operating as a separate business. In 2008 the SNCB carried 207 million passengers a total of 8,676 million passenger-kilometres over a network of 3,536 kilometers.

4.2 **Brussel**

http://www.mivb.be/index.htm?quest_user=quest_en

Transport in Brussels can be made by means of many private or public transportation means. Private transportation means include bicycle, car and taxi. Public transportation means include Brussels buses, trams, the Brussels metro (all three operated by the STIB as well as a set of railway lines (operated by Infrabel) and railway stations served by public trains (operated by the SNCB).

The Brussels buses network is complementary to the rail network in Brussels, which is made of trams, metros and trains. Brussels buses are operated by STIB/MIVB, a public transport company. It has 50 bus routes and 11 night routes, which run on Friday and Saturday night.

Some buses from Flemish transport company De Lijn and Walloon transport company TEC also ride in Brussels but are not part of the same bus system.

History: The Brussels Inter-communal Transport Company, (French: STIB; Dutch: MIVB) is the local public transport operator in Brussels, Belgium. It is usually referred to as the STIB in English. It is responsible for the Brussels metro, Brussels trams and Brussels buses and for links with De Lijn services in Flanders and TEC services in Wallonia.

Founded in 1954, the STIB currently operates a network of 6 metro lines of (39 km), 15 tram lines (128.3 km) and 51 bus routes (348.8 km). It covers the 19 communes of the Brussels Capital Region and some surface routes extend to the near suburbs in the other Belgian regions. 329 million trips were made on STIB in 2011, representing a 5,6 % increase from the previous year. The company aims for 400 million trips in 2016.

4.2.1 Plan for development I Brussel

Real theme of the policy on transport and public works, the multi-year plan 2010-2014 "Brussels, a pragmatic ambition" highlights the main priorities in these areas for the next 5 years.

The Brussels-Capital Region is confronted with many challenges in transportation and public works. Eg car traffic which must decrease by 20 percent by 2018. The plan can be studied for further information (in French) (<http://www.bruxellesmobilite.irisnet.be/>)
(<http://www.bruxellesmobilite.irisnet.be/articles/la-mobilite-de-demain/travaux-publics-et-transport>)

4.3 Public API in Brussel

There is one public transportation API. These are available for acquiring live data – all though STIB/MIVB: (<http://www.stib.be/data-sharing.html?l=en>)

It is actually the google transit API (see google API section).

4.3.1 STIB -data sharing

If you wish to develop a new product or application based on the public transport information of STIB, then STIB's data sharing allows you to access our dataset.

"Data sharing" gives you access to our data and the following information:

- The stops and their geolocalisation
- The lines and their rout
- The details of every stop on a line
- The theoretical timetables at every stop

These data are now requested and it seems that this give us a full access to all the API- transport data needed.

4.3.2 Journey planner

There is access to a route planner through the website (<http://www.mivb.be/index.htm?l=en>). It's also possible to preparing your journey through:

- Timetables
- Network maps
- Noctis
- Airport Line

And traveller's guide-services brings you:

- Getting around in Brussels
- All about stops and vehicles
- Travel safely
- Bulky parcels and objects
- Parents and children
- General conditions
- Personalized transport

4.3.3 STIB information begins on the smartphone

http://www.mivb.be/realtime_gsm.html?l=en

The real-time information of STIB is now available on all Mobile platforms in order to better inform our customers. These applications allow you to use public transport on the spot without too much planning.

4.3.4 Payment

It's possible to buy your tickets at: Bootik, Kiosk, "GO" –Vending machines underground, Shops/Retail shops , ON the busses og De Linj, ON the busses of TEC or Bootik Online – 24/7.

Payment API's has at this point not been able to locate.

4.3.5 Trams/Metro and buses

Metro: The metros run from the east to the west of Brussels. They have a very large capacity and run entirely in exclusive lanes, which avoids any risk of traffic jams. The current fleet has 5 series. The latest series, known as the "boa", have been put into service at the beginning of the new school year of September 2007. Map and info. for Metro: <http://www.urbanrail.net/eu/be/brux/brussels.htm>

Tram: Trams are the intermediary solution between the metro and bus, and the fleet is divided up into 6 different series. The 2 latest series, known as the 3000 and 4000, take advantage of past experience to offer great comfort: leather seats, larger capacity, access for persons with reduced mobility, quieter vehicles, etc.

Buses: The bus fleet contains the most vehicles. It is also the fleet with the most lines. Buses have a lower capacity than metros and trams, and they are a good solution for local services or places where it wouldn't be possible to lay down tram tracks.

4.4 Summary Brussel

Brussel is covered with only one primary transport organization: SNCB (English: STIB). The public company STIB can hopefully provide live data and static data API for all the public transportation in Brussel. STIB has already a system that provides journey planner tools and passenger information systems like live data, elderly pick up services and smart phone services. Still it has not been able to locate any payment API for Brussel but it is for the moment likely that we can provide these data from STIB.

4.5 Antwerpen

The city has a web of tram and bus lines operated by De Lijn and providing access to the city centre, suburbs and the Left Bank. The tram network has 12 lines, of which the underground section is called the "premetro" and includes a tunnel under the river.

There are 1 primarily company who controls the main part of the transport sector in Antwerp.

De Lijn: Controls; Bus-systems, Tram-systems, Belbus-systems and Metro-systems. They runs about 3650 buses and 359 trams. De Lijn is being viewed as an integral part to reduce heavily congested traffic, together with the NMBS (Belgium's rail provider).

<http://www.delijn.be>

The secondary company is NMBS/SNCB (in English STIB) and controls only train systems:

NMBS/SNCB: NMBS/SNCB is the National Railway Company of Belgium. They controls the railraystems of Belgium in collaboration which De Lijn. SNCB:

<http://www.b-rail.be/main/E/index.php>

The public transport system in Antwerp is run by De Lijn since 1991, which also is the public transport company, and is based on trams and buses, with an underground tram line running through the city and under the river Schelde. Multiple-ride or season tickets can be bought at De Lijn booths, in some newsagents, banks and at railway stations.

The services from De Lijn includes bus, belbus, tram, metro and local traffic schedules and available routes are managed by the same operator – De Lijn, and train are manage by the NMBS/SNCB.

4.5.1 Payment

<http://www.delijn.be/verkooppunten/eshop.htm>

It's possible to buy your tickets at the tourist office, newspaper shops, supermarkets, ticket dispensing machines at the tram/bus stop itself or online – 24/7 or through your mobile smartphone.

To buy tickets by SMS you can only use telecompanies as: BASE, Mobistar, Proximus and Telenet can all purchase an SMS ticket.

You can also pay by using credit cards, Bancontact, online banking, PayPal or bank transfer.

Worst case scenario: buy your ticket on the bus/tram directly from the driver - but be prepared to pay extra.

4.5.2 Journey planner

There is access to a simple route planner(see picture below) <http://reisinfo.delijn.be/reisinfo/?taal=nl> * and that it's connected to a listing of possibilities/services <http://www.delijn.be/reisinformatie/index.htm> . These services give access to online mobile smartphone(Iphone) updates or mobile route planner and different others possibilities/services

...Route planner in general

You can plan a trip with the route planner by entering the following details:

- a starting point
- a destination
- corresponding details like time, address, stop, etc.

The route planner looks up the best route for you; it takes into account the details that you entered.

4.5.3 Trams/Metro and buses

In Antwerp, the tram/metro stops are managed by De Lijn and are provided by the schedule boxes. It shows the tracks, time left and a couple of stops until the place you are about. Each of the 12 tram lines in Antwerp is color coded:

e.g: 2 Hoboken-Linkeroever GREEN It also shows, indicated with a red (moving) light where the tram is at the moment so you can see how long you will have to wait. Very helpful it is when you have to catch a tram you will be able to see if you have to run or if you still have plenty of time left.

The Antwerp Premetro is a network consisting of lines 2, 3, 5, 6 and 15 of the Antwerp Tram system. It is a 1000 mm rail gauge system, which runs underground in the city centre and further out on surface lines, which are separated from motor traffic. It is intended eventually to evolve into a full metro, similar to the Brussels Metro or German Stadtbahnen (light railways). Map and info. for Metro:

<http://www.urbanrail.net/eu/be/ant/antwerpen.htm> From outside the city: www.eurolines.com : detailed information on destinations, timetables and prices Inside the city: www.delijn.be : information about trams and buses

4.6 Public API Antwerpen

We are currently in dialog with De Lijn for accessing their transport API.

Our contact person is within De Lijn is: Stijn Van Oostveldt

Phone: 0032.15.40.89.48

Mail: stijn.vanoostveldt@delijn.be

or Eddy Gielis (coordinator accessibility)

Phone: 0032.15 40 88 78

Mail on eddy.gielis@delijn.be (for blind people)

4.7 Summary Antwerpen

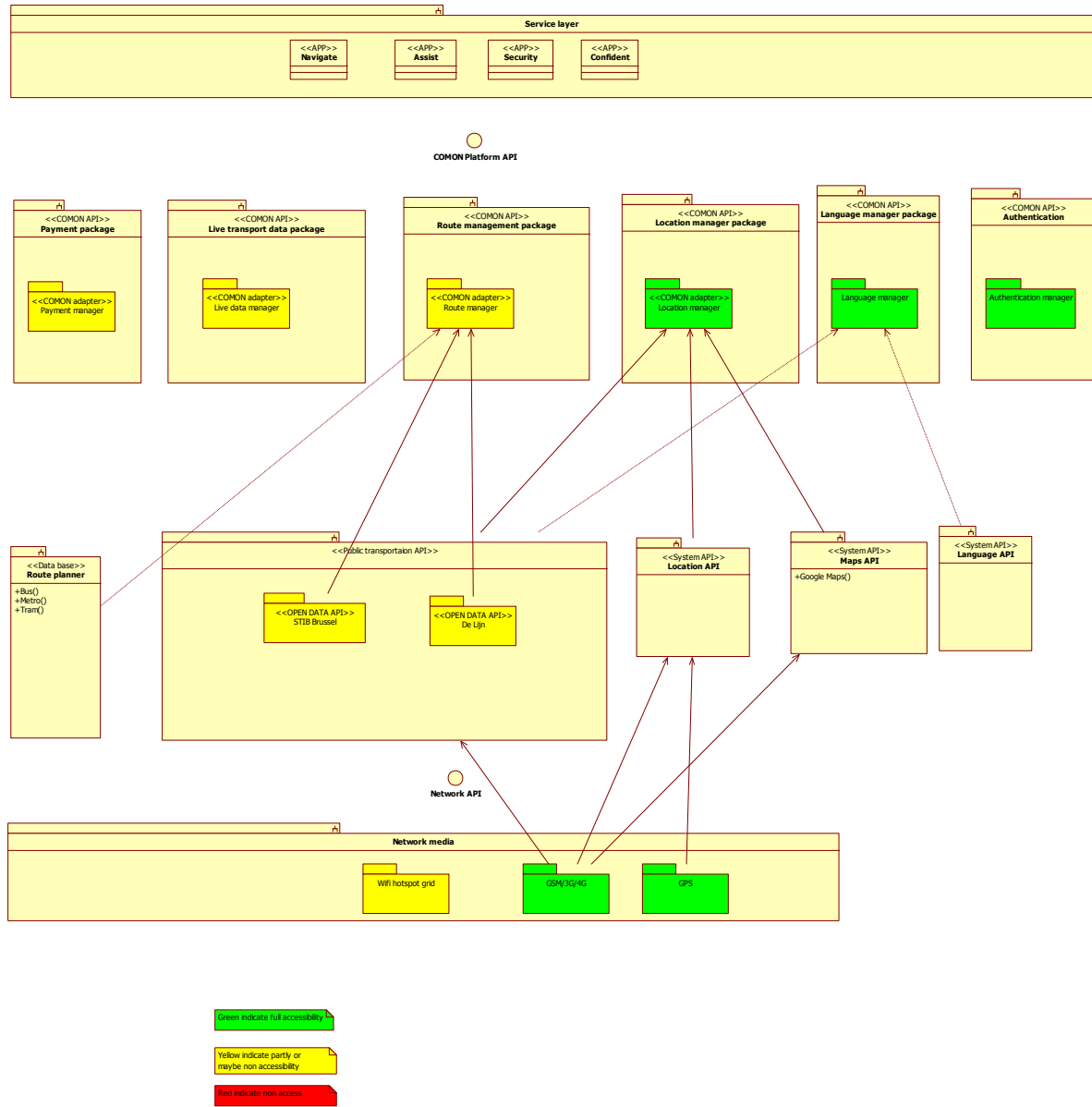
Antwerpen is covered with only one primary organization, De Lijn. Train a busses towards and from the city are provided by "NMBS/SNBC" and some "Eurolines". For the moment, is it difficult to tell if De Lijn can provide API for the all public transportation in Antwerpen, but we have requested to obtain



.....
their API. De Lijn offers a journey planner together with other services like elderly services with pick up services and some smartphone services. On this background it is likely to say if Antwerpen is a candidate.



4.8 Architecture API overview for Brussel and Antwerpen



5 *Copenhagen and Aalborg*

5.1 Denmark Public Transportation Systems

This section describes the Danish public transportation system nationwide and the specific systems in the cities Copenhagen and Aalborg. Copenhagen is candidate city in the COM'ON project, and we include Aalborg in this investigation because it would be technically convenient to have this city as target for a first prototype as Xtel is located in Aalborg.

Nationwide public transportation is mainly provided by DSB, the Danish nationwide railway system. Furthermore there exist a number of companies providing inter-city bus transportation, e.g. X-BUS.

Public transportation in Copenhagen is delivered by three providers: DSB, Movia and Metroselskabet (Metro).

In Aalborg, public transportation is driven by Nordjyllands Trafikselskab (NT) and DSB.

5.1.1 DSB

DSB is an independent public company owned by the Danish Ministry of Transport. DSB provides train transportation between larger cities in Denmark.

www.dsb.dk

5.1.2 DSB S-Tog

DSB S-Tog is a company fully owned by DSB. S-tog is local train transportation in Copenhagen and surrounding area. The danish S-tog is comparable to other large cities underground or Metro's. It supports for quick and frequent transportation between areas of the city. There are about 75 S-Tog stations in Copenhagen and nearby area.

<http://www.dsb.dk/s-tog/>

5.1.3 Movia

Movia runs the Bus transportation in the east part of Sjælland and thereby also Copenhagen. Movia is a special transportation company which must obey laws regarding public transportation. Movia does not operate the transportation itself. Instead the operation is licensed to privately held companies.

<http://www.moviatrafik.dk>

5.1.4 Metroselskabet

The Copenhagen Metro is driven by Metroselskabet, a company owned partly by the Danish Ministry of Transport and the communes of Copenhagen and Frederiksberg. The Copenhagen Metro is an addition to the existing S-tog net. The purpose of the Metro is to connect important parts of Copenhagen with a fast and frequent transportation. Currently the Metro is still being expanded and today it consist of two lines, one servicing the Airport and one servicing Ørestaden (large business area).

<http://www.m.dk>

5.1.5 Nordjyllands trafikselskab (NT)

NT runs the public bus transport in the North Jutland area. NT is similar to Movia – it is a cooperation between a number of communes in the area. Likewise NT does not have its own busses but outsources that part to subcontractors.

<http://www.nordjyllandstrafikselskab.dk>

5.1.6 Journey planner

Rejseplanen is the common journey planner in Denmark. All train and bus operators deliver data to Rejseplanen which then can be used to plan any journey in Denmark. Although transportation companies may have their own journey planner we will only focus on Rejseplanen.

www.rejseplanen.dk

5.2 Public API

Rejseplanen provides a public API with access to time schedules, route information and live data. This data covers all transportation types in – at least – Copenhagen and Aalborg.

<http://labs.rejseplanen.dk>

Rejseplanen may not provide live data for all transportation types or routes. This may be supplemented by data from other sources.

NT has real-time data for the busses, but there is no public API

Movia has realtime data, but there is no public API

DSB (and DSB S-tog) also provides a public API, with access to live data about arrivals/departures . This API also provide an RSS feed with information of relevance to users of the transportation service.

<http://dsblabs.dk>

In general these API's are free to use, and it is allowed to redistribute the data under certain fair rules.

5.2.1 Ticketing

For all transportation types in the two cities, there exist the possibility to buy tickets using an SMS service. The payment is then collected over the phone bill.

For Copenhagen, there exist app's that allows the traveller to buy tickets using credit card.

Also, it is possible to buy tickets directly in the bus, whereas Train, S-Tog and Metro tickets must be bought prior to the journey using vending machines on the station.

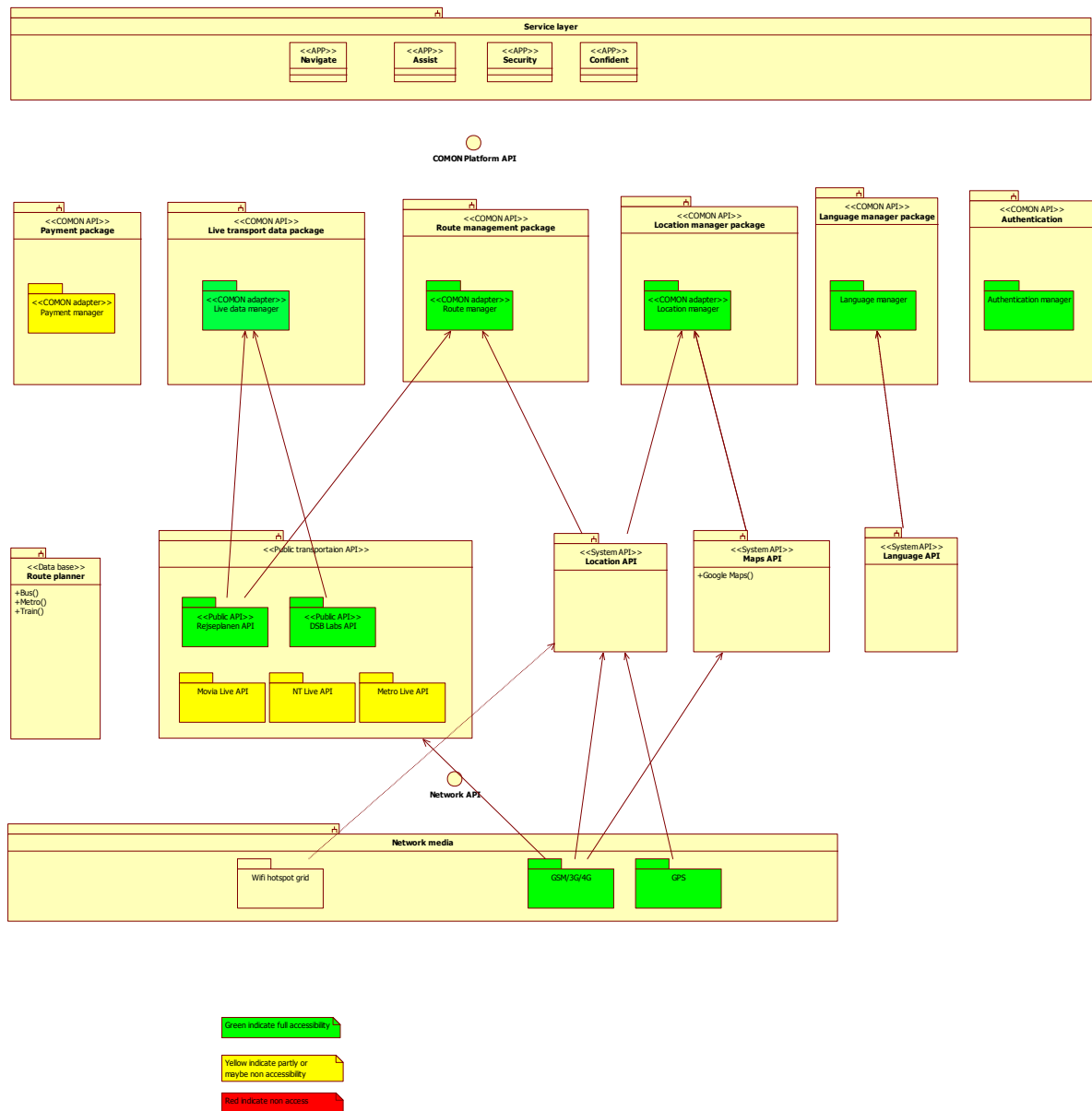
There is no public API's for this service.

5.2.2 City Services, Infrastructure and others

The network infrastructure in Copenhagen and Aalborg is 3G (and 4G) mobile network. There exist wifi-hotspots, but this is not something central controlled nor is it's coverage at a useful level.

There is no common service platform in any of the two cities. The municipality of Copenhagen offers some services - in form of app's . For example cultural events.

5.3 Architecture API overview for Copenhagen/Aalborg



5.4 Summary Copenhagen and Aalborg

Copenhagen and Aalborg are very similar with respect to public transportation and access to public transportation data. There is easy access to data through Rejseplanen's API, which can be used freely.

Aalborg may not be the size of a metropolis, but the location near Xtel makes it an ideal city for implementing a first prototype for the interest of technology choices.

6 Amsterdam

6.1 Public API

One public transportation API is available for acquiring static and live data, openOV API.

The API provide dynamic stop times for the Amsterdam urban region, province of Utrecht and Utrecht Regional Directors are brought to you via a VPN to GOVI. This organization controls the receipt of public transport data carriers for use in Dynamic Travel System (DRIS), you can think of at the signs at the stops. Through GOVI, the API give you initial access to all stop information from the metropolitan region and for a number of buses you can receive live data.

API: The municipal public transport company of Amsterdam, GVB, as the first city or regional public transport organization in the Netherlands, will start releasing real time data on its trams and buses. The step is the result of a request for the data by volunteers of the OpenOV (open public transport) project, which aims to create an interface for all Dutch public transport data. Developers can then build their apps on this generic interface.

The OpenOV project already collects data on the official schedules of public transport, but is ultimately interested in providing real time information, which takes into account the possibility of a bus being delayed or even slightly early at a stop.

The GVB, Amsterdam's public transport company, has responded positively to the request for real time data. GVB indicated the conditions set by the region of Amsterdam when the public transport service concession was awarded to GVB, already required them to make this step.

6.1.1 License

The static information published by us falls under the CC-0 license: you can always reuse. Different providers have different dynamic travel of conditions; KV78turbo: GOVI conditions Directors Region / Province of Utrecht: GOVI conditions Dutch Railways: NS-API conditions

6.1.2 Static Information

Static information is unlocked in different places, on the basis of the format of the data. • Torque Flat 1, directly from the carriers: kv1.openov.nl • Pair face 7 Turbo, integrated by GOVI: kv7.openov.nl • DBSLayer directly into SQL search in the database. • gtfs by openOV made based on web services of carriers: gtfs.openov.nl

6.1.3 Dynamic information

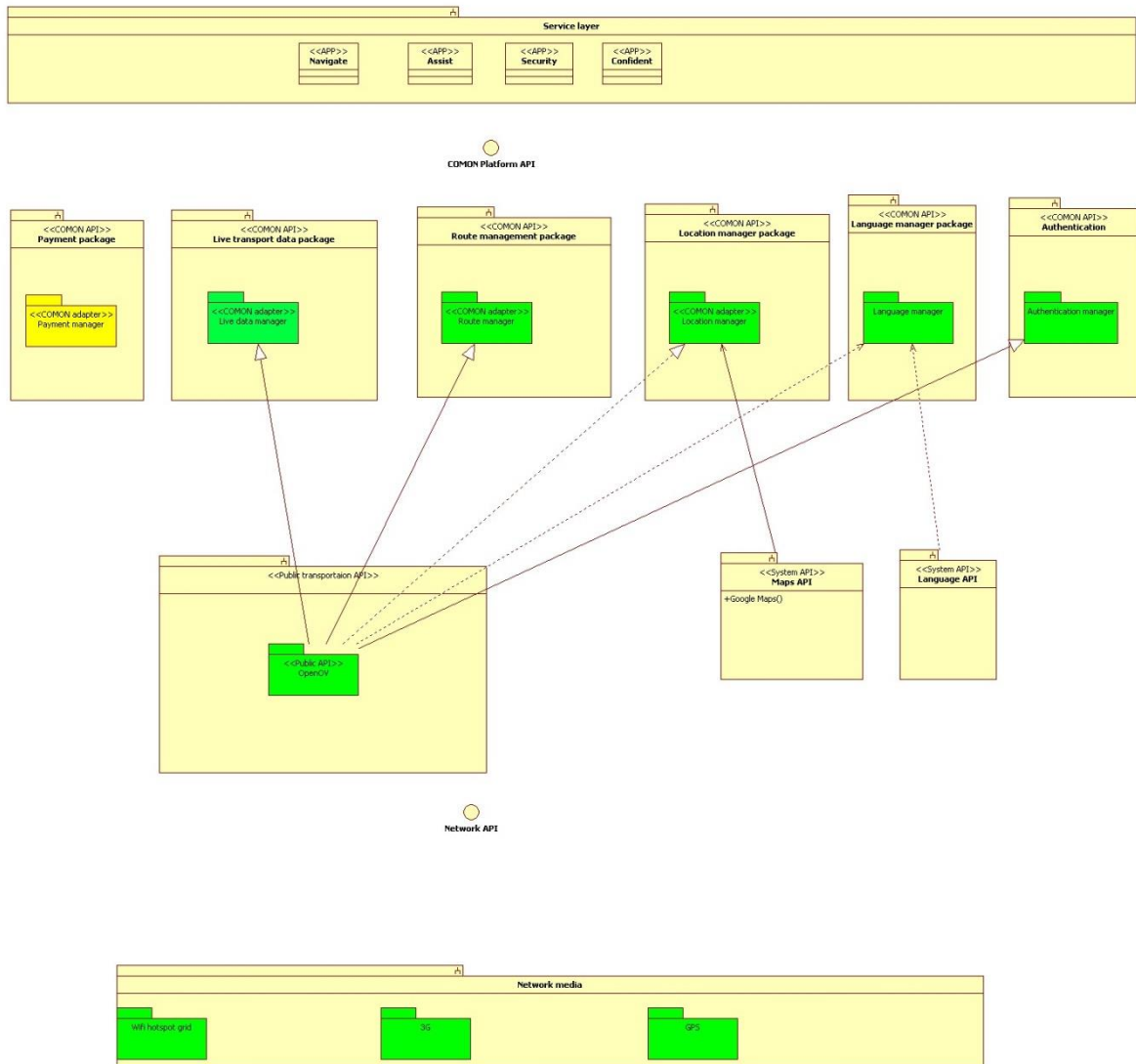
The first information is provided to us via Interface 55. (<http://api.openov.nl/kv55.html>). Underwater, this is an asynchronous communication with a database, because few people are waiting for an asynchronous answer to their queries, there is a REST interface made for this service. What you see is what we get. The site also offers over XMPP PubSub API to a NS, you can use it without API key also see <http://nsapi.xmpp.openov.nl/stations/ut/avt/>

New! They are currently developing to KV78turbo, information on the Google Group (<https://groups.google.com/forum/?fromgroups#!forum/openov>).

6.1.4 Support

For questions about the API, ideas and suggestions you can always visit their Google Group. (<https://groups.google.com/forum/?fromgroups#!forum/openov>) Public API: <http://api.openov.nl/>

6.2 Architectural Overview



6.3 Summary Amsterdam

Amsterdam is covered by openOV API. This API covers real live and static data for the public transportation in Amsterdam. Unfortunately the language is in Dutch. No payment API or service API has been found.

7 Luxembourg

Luxembourg City has high number of visit-workers, from neighbour countries, coming into the City during the day. This has initiated the HotCity platform, which serve as service platform for Citizens, visitors and tourist. HotCity has established well structured infrastructure, based on a Wifi grid covering most of the City. With HotCity, the WiFi network of Luxembourg City and P&TLuxembourg, you can access the Internet and a whole host of services offered by the City of Luxembourg for its residents and visitors.

In Luxembourg City, whether you're on a terrace or in the street you can use your laptop, PDA or mobile phone to read your mails, keep in touch with friends, surf the net or access cultural information, services in the city and special offers in the shops. One API covers the authentication of the user and services to easily communicate with the Hot City platform. Another API covers the services available within the HotCity network. A third API covers the transportation interface.

7.1 Public API

The public API of Luxembourg City will be HotCity.

7.1.1 Transportation API

The Transportation API collects data on the official schedules of public transport. In Luxembourg public transportation consists of several Bus lines. Via the API it is possible to monitor live updates of the Bus traffic information and to request static data such as Bus schedules for different Bus lines.

7.1.2 HotCity API

This document presents the API to be used by applications running on the HotCity environment. This API offers applications the capability to easily communicate with the HotCity platform, using Web Services. The API gives access to various functions with, for example, the opportunity to localize the user, to get information about device's capability, provide map for the current location of the user.

The public HotCity API can be found here:

<http://www.docstoc.com/docs/24240186/HotCity-API-Users-Manual>

7.1.3 Service API

The Service API provides a range of services such as "Find in the City / Seek and Find!", "News / Keep up to date!", "Vis-IT / my e-Guide", "Nightlife / What's up tonight" and "AGENDA / AGENDA".

Find in the City / Seek and Find!

Find in the City is a search engine of point of interest (restaurants, shops, playgrounds ...) containing hundreds of locations and a multiple criteria search engine. This is based for a large part on the geographic information system of the topography department of the city, but also on other information systems of various partners. This application is a local, location-based service.

News / Keep up to date!

Leading media companies of the Grand Duchy of Luxembourg have joined the HotCity project. Our



News Gallery is a selection of national and international news coming from RTL, L'Essentiel, Tageblatt (+ Eco Tageblatt), Le Jeudi.... This information is available for free on the portal and it is the ideal solution to be informed, anywhere, anytime.

Vis-IT / my e-Guide

Vis-IT offer sightseers a practical guide of the most useful addresses and a list of cultural and leisure sites in the surroundings. In addition, Vis-IT suggests you thematic circuits and allows you to create **personal itineraries**.

This feature set comes in various combinations depending on the user's device (desktop, laptop, mobile, iPhone), and whether the user is connected to HotCity or not.

Nightlife / What's up tonight

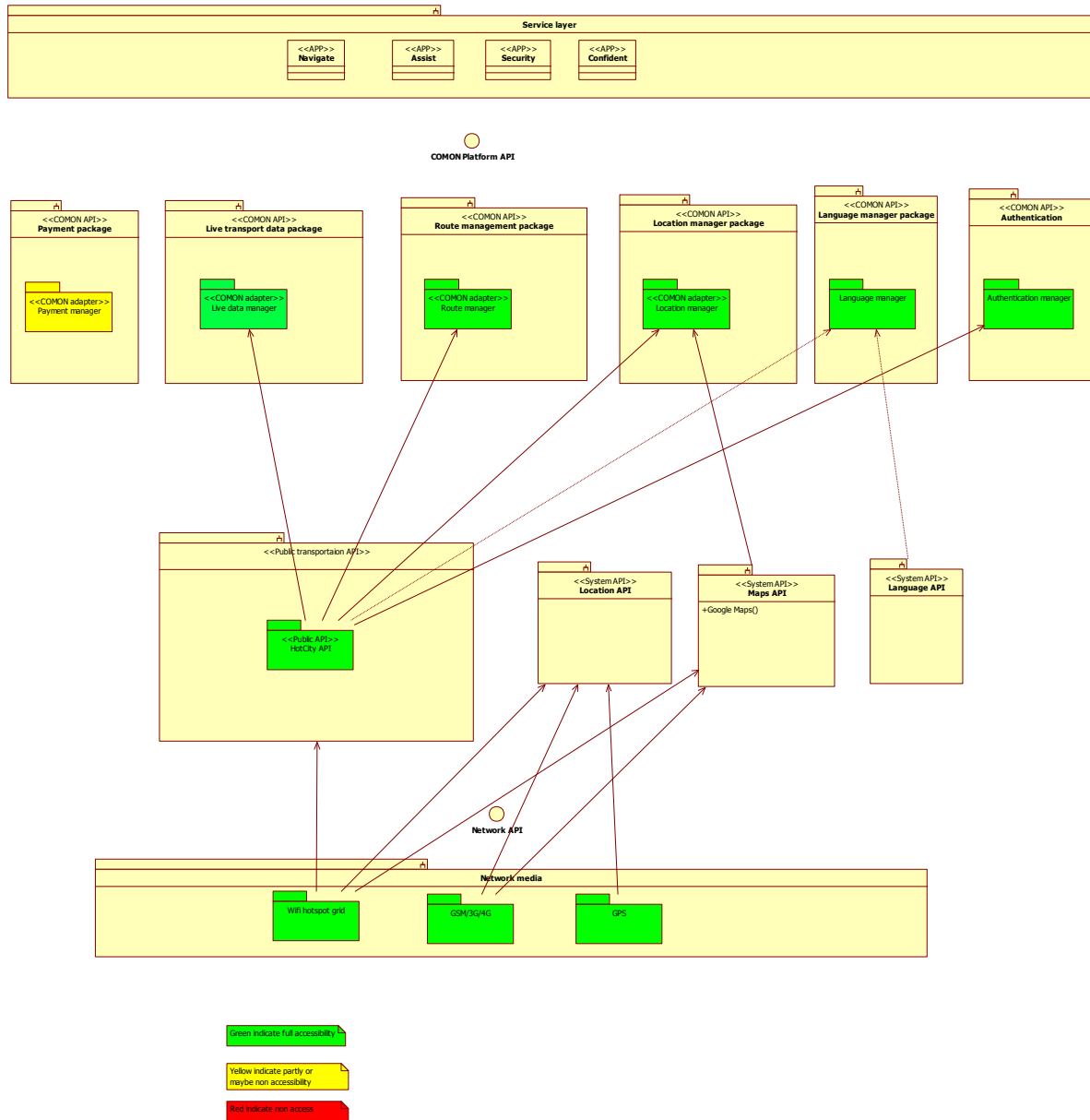
The application NIGTHLIFE shows you the best events and hippest places to party in Luxembourg.

AGENDA / AGENDA

Culture lover? The agenda keeps you informed on all cultural events in the Grand Duchy.



7.2 Architectural Overview



7.3 Summary Luxembourg

The HotCity platform, which is implemented in Luxembourg, offers all the needed information that is required in order to implement the COMON project. You are able to get static transport data such as Bus schedules and dynamic transport data such as information about delays on the Bus lines. You are also able to authenticate the user on the network which is necessary when charging of the user has to take place. Furthermore the HotCity platform offers location services as well of different services offered by the City of Luxembourg. Another advantage is that the HotCity platform is well tested and maintained since it has existed in some years now. Some of the API's have not been found yet but we are in dialog with HotCity in order to get access to the Transportation API.

8 Google API

The idea of taking Google API into account, for using their API, has several purposes. First of all, Google offers a transport API 'Google Transit' that shares the same interface for huge collection of Cities throughout the world. This means that COM'ON could use one single interface in order to access public transportation data. But also interesting of Google is that they provide a handful of API's which can be used in conjunction with our COM'ON platform.

Google Map Content Partners (<http://maps.google.com/help/maps/mapcontent/>)

Google MAP API.

Google Street view API

Google Cities in 3D API

Google Imagery API

Other Google API candidates for using in COM'ON platform:

Google Games API

Google TV API

8.1 Google Transit

<https://developers.google.com/transit/?hl=da>

[GTFS](#): The General Transit Feed Specification can be used to exchange *static* transit data.

[GTFS-realtime](#): An extension to GTFS, this specification can be used to exchange *realtime* transit data.

Supported Cities, for Google transit API, in COM'ON:

Helsinki	[X]
Copenhagen	[X]
Aalborg	[X]
Barcelona	[X]
Luxembourg	[]
Amsterdam	[X]
Antwerpen	[]
Brussel	[X]

Prising

<https://developers.google.com/maps/licensing>

8.2 Summary Google API

Google has a wide range of API's and functionality which can be considered using in COM'ON platform. The Google transit API offers a shared API for accessing and obtain transportation information and data in more than 500 cities throughout the world. Additionally Google offers several other API's which potentially can be used somehow in COM'ON.

Google is though a commercial company and by using Google API's in a commercial matter it will be licensed. Furthermore by using Google API we will be dependent on a commercial company in the future.

It will be a political more than a technical decision if choosing Google.

9 Conclusion

We (Xtel) are convinced that each City, involved in the COM'ON project, can offer some kind of static data and some dynamic data information regarding public transportation. Each City also provides a comprehensive technological service, for their daily public transportation travellers.

Except Antwerpen and Luxembourg all Cities are covered by the Google transit API. The Google API have the advantage of offering the same API for the supported Cities. This, of course, means faster and easier development. Additionally Google offers several other interesting API's that COM'ON could be using. But it is a political and business decision if COM'ON should make use of Google.

From the experiences and knowledge of this report, we have divided the Cities into different categories. This should be seen as a suggestion and presentation for a discussion.

Category 1. Pilot project

Aalborg City will be a candidate for an initial prototype. The idea of using Aalborg is to get a first impression of the obstacles and the technology challenges that follows the core functionality of the COM'ON project. It will be easy for Xtel to establish the necessary contacts and information to roll out this prototype quickly. And testing can be done on a daily basis and will be an advantage at this phase of the project,

Luxembourg City has the well structured platform HotCity established. This City could be a candidate for establish and gain experience and knowledge of a service platform.

Both Cities are small, compared to the other COM'ON Cities, and they only offers bus transport. This should be seen as an advantage at the beginning of our project.

Category 2. Test Cities 1

Helsinki and Copenhagen have both been easy to obtain the necessary information regarding public API's etc. The material and documentation seems to be well structured and easily accessible.

As we have suggested Aalborg in Category 1, it should be somehow trivial to port the prototype from Aalborg to Copenhagen. So it may not have that much of interest.

Category 3. Test Cities 2

Barcelona, Amsterdam, Antwerpen and Brussel all are candidates for test City in COM'ON. But until now it has not been possible to get the full information needed that is necessary. It may just be a matter of more time in getting these data and information. Even though, they all seem to have a well provided technology basis, of their transportation information system.