

Info Polaris

----- MEMBER IN THE SPOTLIGHT 2 - AUGUST 2007 -----

MOBILITY CHALLENGES IN TRONDHEIM, NORWAY'S SILICON VALLEY



Trondheim is Norway's Capital of Technology. The City hosts the internationally renowned NTNU (the Norwegian University of Science and Technology), Scandinavia's largest scientific research corporation Sintef and a myriad of small and growing technology start-ups and companies. Every sixth inhabitant of Trondheim is a student, which makes it a youthful and future-oriented City. In addition, great technological effort is put into turning scientific ideas into tangible products and enterprises.

In the field of mobility, innovative solutions have already been developed and implemented, and Trondheim remains a living test site for future challenges.

Wireless Trondheim transport applications



Since September 2006, Trondheim has been one of Europe's first wireless cities, i.e. 1/4 of Trondheim's inhabitants (mainly students NTNU and College and elementary school pupils) have free high-speed wireless access to the Internet. Today, Wireless Trondheim provides outdoor coverage in most of downtown Trondheim (120 access points).

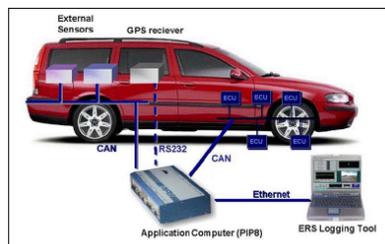
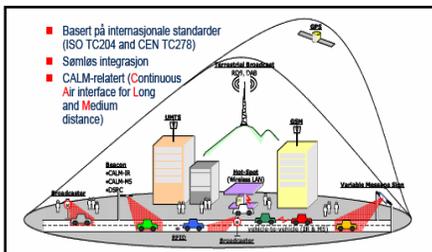
Wireless Trondheim was initiated to facilitate research and development and to attract students, researchers and companies to the University and to Trondheim.

Wireless Trondheim is a private-public owned company with its roots in NTNU. The owners of Wireless Trondheim are NTNU (40%), the City of Trondheim (10%), the Sør-Trøndelag County (10%), the regional media company Adresseavisen, the regional bank SpareBank 1 Midt-Norge and Trondheim Electricity Utility. Wireless Trondheim's objective is to build and own wireless infrastructure and to arrange and facilitate research and development within wireless technologies and services.

The coverage is based on an advanced Wi-Fi platform. This is a well-suited platform for testing new and innovative services as it supports:

- Mobility – the user can move across the whole coverage area without losing connectivity
- High capacity – every access point has at least 10 Mbit/s symmetric connectivity to the backhaul network offering the possibility to test high bandwidth demanding services
- Location information – the network gathers location information from the users and offers the possibility of presenting services depending on the actual location of the user
- Security – the network supports all well-known standards for security in Wi-Fi including WPA/WPA2 allowing services with a high demand for security

The main current transport application is related to comfort. Wireless Trondheim offers a unique seamless internet connection throughout journeys in buses, taxis or for any other transport mode within the covered area. One original aim pursued by NTNU was to give the opportunity to its students to attend on-line classes in the bus linking the two campuses.



Specific ITS applications, cooperative systems (Vehicle to Vehicle and Vehicle to Infrastructure communication) are currently being tested (communication based on CALM technology). Wireless Trondheim also provides a network laboratory which includes a weather proof data cabinet along the main highway of the City for research and development in this field.

Instrumented vehicles are currently being tested and first applications are expected for 2008.

Within the next 3 to 5 years, new mobility applications of Wireless Trondheim are planned to be implemented, such as

- real-time information on the availability of public bikes;
- real-time information on congestion, traffic incidents, illegal parking, road works, etc.
- privileged access for delivery services to parking slots;

The city centre of Trondheim has a very limited amount of entries and exits, as well as alternative routing. The traffic flow is vulnerable to minor incidents, snow-fall, brake-downs, maintenance and illegal parking. However, short distances and the near future completion of city centre bypass network, financed by the completed toll ring, will soon raise the potential of dynamic traffic management systems by web-cast, GPRS and other standards covered by the Wireless Trondheim platform.

Trondheim's transport system: overview and challenges



98% of public transport vehicles ride on rubber, 2% only on rail. The last remaining bit of the Trondheim Tramway is an 8.8 km single-track route. The main reason for this is that Trondheim's tramway, the Gråkallbanen (the northernmost tramway line in the world) is one of only two in the world to use the combination of meter gauge and 2.6 meter wide cars. This made it practically impossible to sell the trams. In the end they were not sold, and instead a company owned by 1400 enthusiasts, Gråkallbanen AS, was created to operate the tram route on the only remaining line that started in 1990. In 2004, Veolia Transport Norway, bought the company and announced that it will invest another NOK 10,7 million in improved infrastructure on Gråkallbanen.

Trondheim possesses a bus fleet of 200 vehicles using traditional diesel. This causes some air quality nuisance in the City Centre. The City tried to remedy this by promising to increase the speed of public transport. However, since 2005 (when the tolling system in the City Centre was dropped), the speed of public transport has actually decreased by 10%.

From 1991 to 2005, a tolling-system was in place in the City Centre. Politicians promised at that time that it would only be a provisional measure to finance the renewal of infrastructure, especially for cyclists and pedestrians. Today, tolling-systems are still in place at the entrance of the City area (outside the City Centre). As traffic congestion remains an important concern, the City is discussing the possibility of a new tolling scheme for the City Centre. One internationally known tolling-systems company is seated in Trondheim: Q-Free (interoperability through Autopass).



Trondheim has 125 public city bikes available for citizens and tourists. They are located in ten bicycle racks in and around the city centre. The bikes are locked to the racks with electronic locks which can be unlocked with an electronic card. The cards can be obtained at the Tourist Information Office at the market square.

Trondheim is also famous for its bicycle lift, currently the only one in the world: The Trampe. The prototype was built in 1993 and it is still in service today (Length:130m / Speed: 2m/s (7.4km/h) / Propulsion: Electric).



Trondheim has an advanced ticketing system. Tram (and bus) tickets can be purchased by sms (automatic credit check system).

The same system is also used for parking and tolling-systems.

How to buy an SMS- ticket:

- 1. Create a new SMS on your mobile**
- 2. Type one of the code words for the ticket you want to buy:** (GBV=Adult, GBH=Senior, GBB=Children, GBF=Family, GBN=Night tram)
If you wish to buy several tickets at the same time, type the number you wish to buy after one of the code words above (ex: GBV3)
- 3. Send the SMS to the number 2097**
Store the number **2097** on your mobile, that way you will always have a ticket service on your mobile.
- 4. Your ticket will be received as an SMS**
Show this ticket to the driver when you go on board the tram.
Keep the text message during the whole trip, just like you do with a normal paper ticket.

Trondheim in European Projects

Trondheim currently carries out city-wide studies and small-scale demonstrations in the framework of the European Project CityMobil to promote driverless solutions within its own locality. The overall aim of the CITYMOBIL project is to investigate and test advanced concepts for innovative autonomous and automated road vehicles for passengers and goods, embedded in an advanced spatial setting.

Trondheim has benefited from being part of the INTERREG 3C project LIVABLE CITY. Together with Lincoln, Norwich, Gent, Emden and Odense, Trondheim has put joint a lot of efforts into improving the quality of life for residents and visitors. Trondheim hopes to extend this activity within URBACT2, and is looking for partners.

Trondheim has also developed into a regional centre for logistics. The combined terminal for freight transport by rail, road and sea has been part of INTERREG 3B project North East Cargo Link. This European project has contributed permitted decisions on infrastructure developments. Trondheim is in the process of extending this activity into the Baltic and North Sea structural programmes.

For more than 15 years Trondheim has taken the role of a pilot city for automatic debiting applications. The now widely adopted AUTOPASS standard is implemented and operated on toll roads, ferries, bridges and parking facilities in Norway and Scandinavia.

For more information on Trondheim: www.trondheim.com/engelsk.

For more information on Wireless Trondheim: www.wirelesstrondheim.no.

Contact: birger.elvestad@trondheim.kommune.no

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