

The Fully Networked Car

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The fully networked car. Cars talking to each other, reporting traffic data, warning drivers of upcoming hazards, suggesting the optimal route in order to conserve fuel. Accessing e-mail, stock prices, facebook and twitter. Just a few years ago that would have sounded like science fiction. At what speeds technology evolves these days, the prospect of the fully networked car does not seem to lie in the too distant future.

Not that long ago, to be exact in 1996 BMW was the first auto manufacturer to introduce RDS-TMC (Traffic Message Channel) as part of its GPS navigation system offering bringing real time traffic information supplied by government agencies to the customer. Let's think about it, using the FM sub channel, TMC supported, and still does so today, a bandwidth of 100 bits per second. 100 bits per second, compare that with what is common today! Everyone who uses an Smartphone on a 3G network is used to up to 7 Megabits per second, or your typical internet connection at home at more than 16 Megabits per second. Think about that, 16 Million bits per second as opposed to 100 bits per second. What a difference! Yet, RDS-TMC is still a very successful and well established transmission method for traffic information throughout Europe and North America today. Why is that the case? What is it that made RDS-TMC so successful. First of all, it was created to address one of the drivers most basic needs. To get from A to B in the fastest way possible or at least to know beforehand if there would be disruption ahead. A feature that the customer uses and appreciated on every single trip he takes. Secondly RDS-TMC relies on FM Broadcast, a transmission technology that is paid for already. No additional infrastructure to roll out, not additional operational costs, no issues with limited network coverage. And third TMC is a well established standard, making it easy for suppliers to implement and market in large quantities. And last but by all means not least RDS-TMC supports profit making use cases for OEM Vendors like BMW for example who introduced a commercial pay service for premium traffic information based on RDS-TMC in 2001.

So how does that relate to the fully networked car? Can the technology and the potential applications that are in research today satisfy the same success factors that once made RDS-TMC so popular? One thing is for certain, until we find answers to these fundamental and vital questions things will only move forward on a technical level. The technology is out there, but what is it that is missing in order to deploy this technology?

Maybe it is the answer to probably the most fundamental question that is missing. It is not: How can we make the fully networked car reality? The question should be: Why should the fully networked car be reality? Let us be honest, without the proper answer to this question we will find ourselves first inventing the medicine only to after that find ourselves scrambling to find the matching disease.

Except for some very few tech savvy individuals, it will not be the fully networked car itself, that customers are willing to pay for. From my perspective it is three fundamental customer needs that we need to address. Mobility, Safety, Efficiency and Convenience.

Traffic Information and related mobility applications are probably still the number one use-cases that customers are willing to pay for. Today even more than in the past, life has become a competitive

sport. Being the first to get on the plane, skipping the airport security line, choosing the shortest checkout line at the supermarket, taking the quickest route through rush-hour traffic. It is all about being ahead of our counterparts even just a few minutes, and people are willing to pay for being on the winning side. In the megacity rush-hour traffic scenario that means getting as much information about what is going on out there as possible. Not only traffic incidents and traffic flow are of significance, but also much more granular data like traffic signal timings, coordinated traffic lights, closed roads and roads temporarily blocked by delivery trucks for instance are vital bits of information in this competitive sport.

Just as important although not as apparent in everyday life are applications that increase safety. And just as with mobility applications having access to vital pieces of information is the key. Most situations only turn out to be dangerous because they happen to come unexpectedly. Early and precise warning can in many cases take the spice out of most situations. The emphasis here is on precise and reliable information. Being told to expect slippery roads throughout San Bernardino County for instance isn't much help.

Third with rising oil prices and increasing environmental awareness fuel efficiency has become an important field of innovation. While consumers are reluctant to accept significant cut backs in motoring comfort and driving pleasure they are willing to invest into technology that uses resources wisely and more efficiently. Because the traffic that customers travel in and the customer itself are two of the largest variables in fuel consumption, precise information about what is happening ahead is vital, as it is the case with mobility and safety. This can be by selecting routes where traffic management has implemented coordinated signal timings and reducing unnecessary stop and go driving, or by preparing the driver or the vehicle of the traffic signal ahead changing from green to red as an example.

And finally ways that help people simplify their lives is what today's stressed consumers are looking for. Having vital everyday information like parking availability, walking instructions or public transport schedules at hand makes the everyday routine more easy to tackle. And customers are willing to pay for applications that conveniently and suitably makes this information available.

All of these applications mentioned have one thing in common. They rely on the availability of precise and up to date information and data. This brings me to the second most important open questions. Where does all this data come from and how will we ever be able to access and process all this data? And even if it was physically available, might there be a reluctance to give access to this data? Let us imagine as an example that city districts would give access to their traffic management data, would that not expose their systems to the public judgment on their data quality? You will agree, much more a fundamental issue of government policy than a technical one.

Now, let's talk about deployment for a moment. Technology is great, but how do we make this work in real life? While research tries to tackle the ultimate goal deployment realistically happens in much more gradual steps. While taking a large technological leap might seem to be the most sensible thing to do, considering the business cases and the return of investment restraints that are attached might make large leaps impossible in real life. Finding the right introduction scenario is the key to successful deployment. Building on existing and already paid for technology ultimately favors easy deployment. Before developing complex algorithms to communicate between vehicles and traffic signals, should we not start out harvesting information on static traffic signal timing plans and

design speeds on coordinated corridors and bring that into vehicles as part of the current real time traffic feed in to the vehicle, just to give one example?

The last point I want to make on successfully deploying this technology is a very straightforward one. Where is the profit in the whole game? Let's be honest to ourselves, this thing will not work in the long term if it isn't supported by a solid business case and the prospect of quick return on investment. We are speaking about many good things that we envision for human kind, mobility, safety and efficiency. But at the end of the day it is all about making a profit, or isn't it? We must consider what the key business is of all the players in this game. From an OEM perspective it is selling cars, it is as simple as that. The math behind that isn't a lot of rocket science. How much must I invest in new technology and what is the customer willing to pay extra? How do I create a USP so that customers don't defect to the competition? Just as the car manufacturer, other players in this field have their own key businesses and means to stay profitable. *For content and service providers it is creating valuable information out of raw data, for network provider it is about selling network bandwidth, for universities it is collecting research money and tuition fees, for consultants it is acquiring consultation jobs and for the public sector it is about taking care of public needs and in turn winning elections.* If we can find a scenario where all of these goals and objectives can be met, the fully networked car will become a reality.

As a conclusion let me state this: From a technical standpoint the fully networked car has come a long way. Research has shown great innovations in the past years. CVIS, Safespot, SimTD, AKTIV, IntelliDrive are just a few projects that are coming up with new solutions on how to interconnect the car, the infrastructure and the customer with one another day after day. At the same time standardization bodies have done tremendous work in creating standards in an early stage in order to promote interoperability and keep implementation cost across the board to a minimum. Things are moving forward. What is needed now is a strong focus on real life deployment and business development. With these questions answered the fully networked car will become a reality.

Let's do it!