R16/062_1

RDS2

and the new infotainment architecture

A general data service.

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What was RDS ?

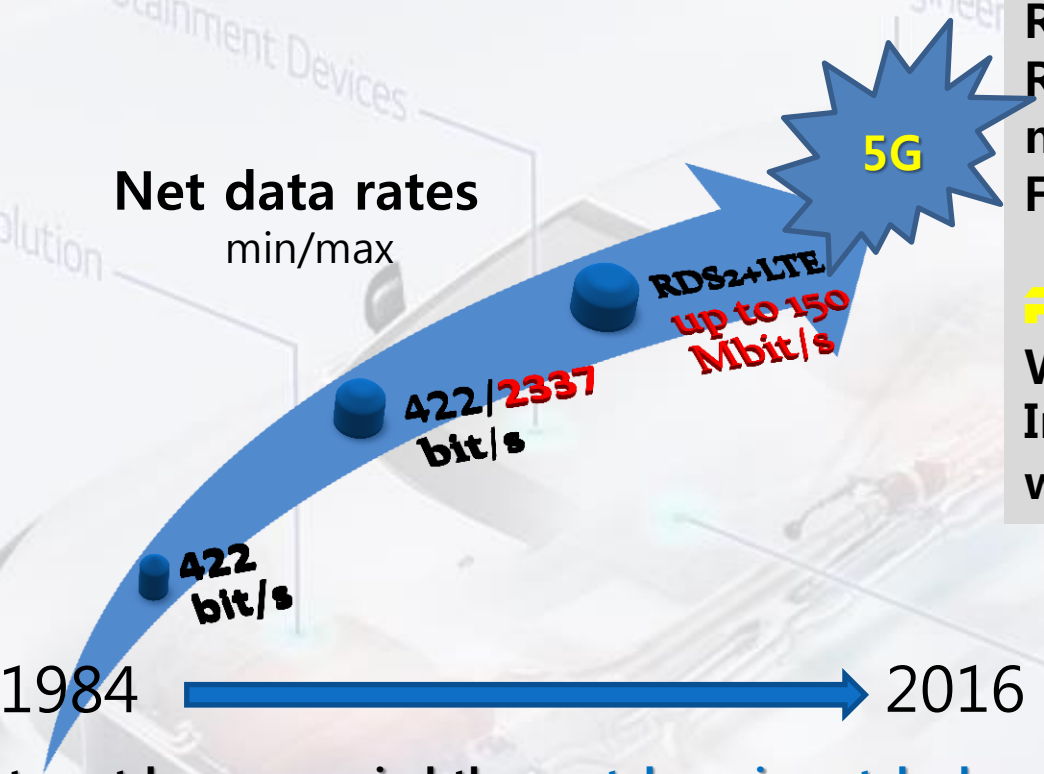
- **RDS was and is a tuner control stream for FM.**
  - **Identification (PI, ECC)**
  - **Frequency following (AF,EON)**
  - **Programme related text (RT)**

  Since 1997
  - **Traffic message channel (limited capacity) (TMC)**

1984 - 30 years before the first connected cars

The future of broadcasting

(and RDS)



RDS =
Radio Data System
not just
FM Data System !!

RDS2 must and will Work also on LTE/5G
Investments in RDS2 will be preserved.

Internet have occupied the postal services, telephone technology, television including DVD-rentals. Today exists more internet radio stations as AM,FM,SAT and Digital together. In few years are all cars connected and we have in the air the same overcapacity of data as on the cable today.
Traditional broadcast remains important but not unique.

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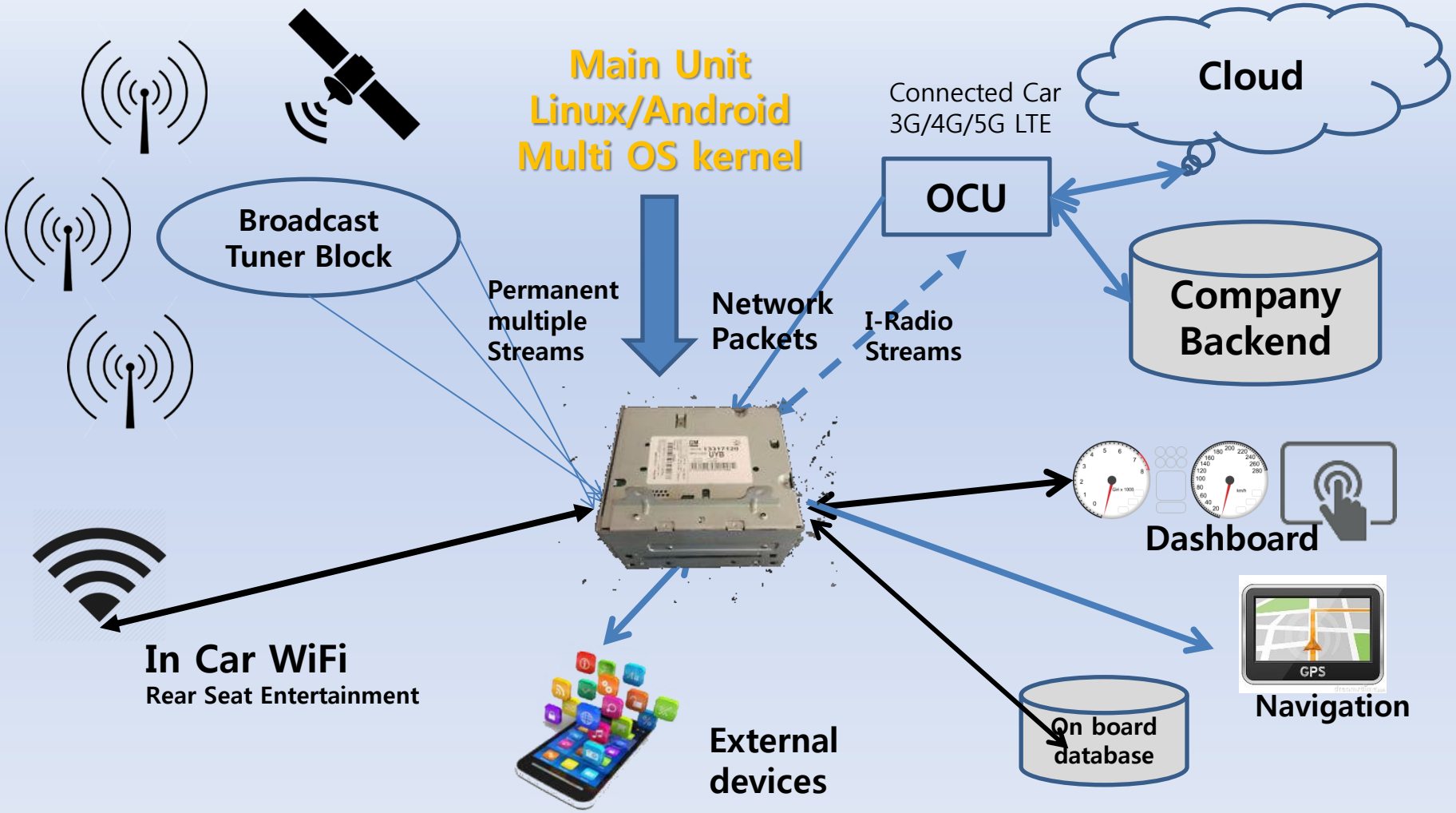
Typical modern car infotainment system 201X



Modern Car Infotainment

Multi source – Audio and Data

Terrestric

AM (also HD/DRM)
FM
CDR (China Digital Radio)
HD-Radio
DAB / DAB+
DMB / T-DMB
DARC (VICS)
DRM30 / DRM+

Satellite

SDARS SiriusXM

Internet

Streaming/Podcast
NextRadio
RadioDNS
Traffic , etc.....

A car radio has to switch between all receivable bearer and this should be seamless if possible. A car infotainment is a multiprocessor system with multiple operating systems and a lot of communication channels. (We need to reduce the complexity maybe with generalized protocols)

RDS2 in Infotainment systems

FM is still the central part of all infotainment systems worldwide on all markets

Most of the FM stations are equipped with RDS

The second most important part is the Internet and is also available worldwide. Most of the FM stations have simulcast over Internet.

Some claim the order will change -
but: both together have wider reach than one alone.

Actually : digitalized audio broadcast plays only locally a role.

RDS2 compatibility

RDS2 was planned as a 100% compatible **extension** of RDS. This was prevented by the chip industry, so compatibility had to be redefined. Now is legacy **RDS** compatible to RDS2 and can tunneled over this.

RDS2 with the the **"C"-Type** groups are now compatible with the Internet and opens totally new possibilities for the future. So can RDS2 coexist unchanged with the future 5G broadcasting and make the bridge between the two worlds.

The NFM (NonFM) packet format, defined in **Annex D**, allows the usage of RDS also by pure internet radios and also special-interest channels for stations that have not enough terrestric frequencies. This simplifies the handling within infotainment systems, since the unique identification is also given there and standardized interfaces and decoders can be used. Since each additional variant of receivers costs money is this a big contribution to the acceptance in the industry.

What is RDS2 ?

- **Superficially:**
  - A tuner control system like RDS
  - extended with a small data transfer system
- **In fact:**
  - It can be a new business model carrier
  - Effective connection to internet broadcasting and services
  - New infotainment architecture
  - The first real usable broadcast data system

Additional features

The C–Type Group:
Up to 34 new data groups per second in 7 byte format on FM.
Supports 64 new ODA servuces parallel to the legacy ODA-s.
C-Type groups have no PI-Code in header, must carry some stream-0 data outside the tuner/decoder for source identification.

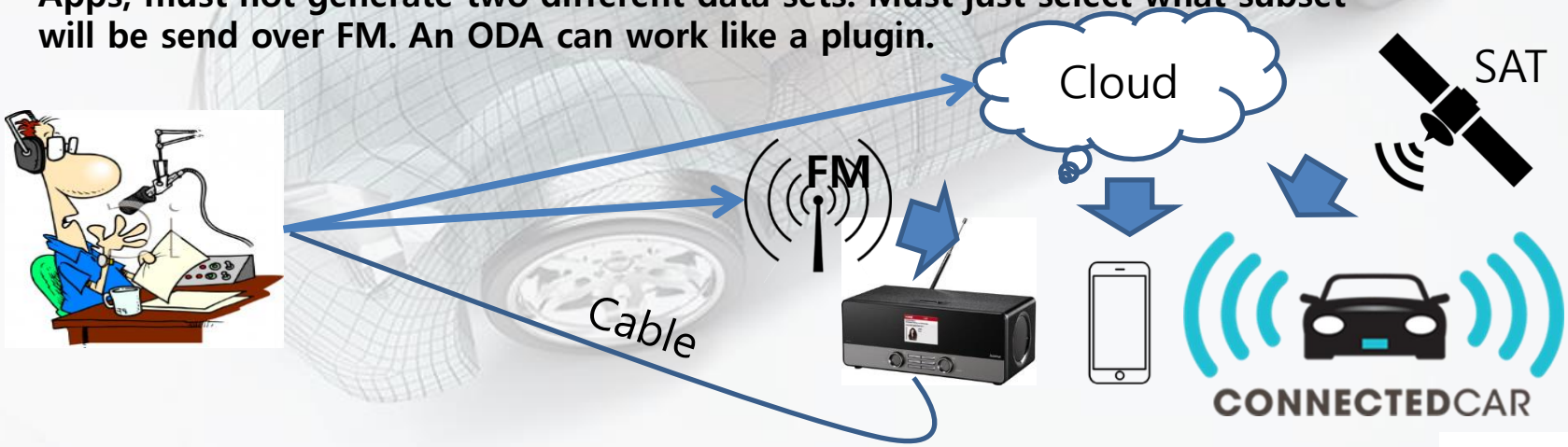
C-type groups are not limited to the single RDS stream.
A multi-tuner or multi bearer environment neeeds an own packet structure.
So the infotainment system can collect data from multiple sources
The sources are no longer limited to the FM broadcast, and also no longer limited to the FM capacity, because the internet and FM sources can be mixed.

NFM Packets (**Annex D** in the new standard) are C-Type groups with tunneling of all RDS Data over all possible bearers: Including all legacy groups.
USB-Cable; WiFi inside the car or buildings, also FM-rebroadcasts; Bluetooth; Internet (e.g. UDP); Cable (e.g. DVB-C) ; Satellite (e.g. DVB-S); and all others that have at least 4 kBit transfer capacity. (DAB not excluded)
NFM packets are not limited to the 34 groups on higher capacity bearers.

Broadcaster‘s business

- can use the possibilities of the new receiver generation. (Computer,Touchscreen,etc)
- can use the capacity itself (+34 groups on FM, near unlimited additional on Internet)
- can sell the capacity for others (groupwise or quantitative) „provider business“
- can mix different C-Type streams also from external to one joint stream
- can extend the broadcasted RDS2 stream with internet RDS2 stream
- RDS ODA-s are not longer limited to special receivers because the car infotainment and the smartphones or other kind of smart radios are updateable and extendable with APP-s.

The broadcaster has a single interface to all possible Apps regardless the transport medium. So not need separate internet Apps and Radio-Receiver Apps, must not generate two different data sets. Must just select what subset will be send over FM. An ODA can work like a plugin.



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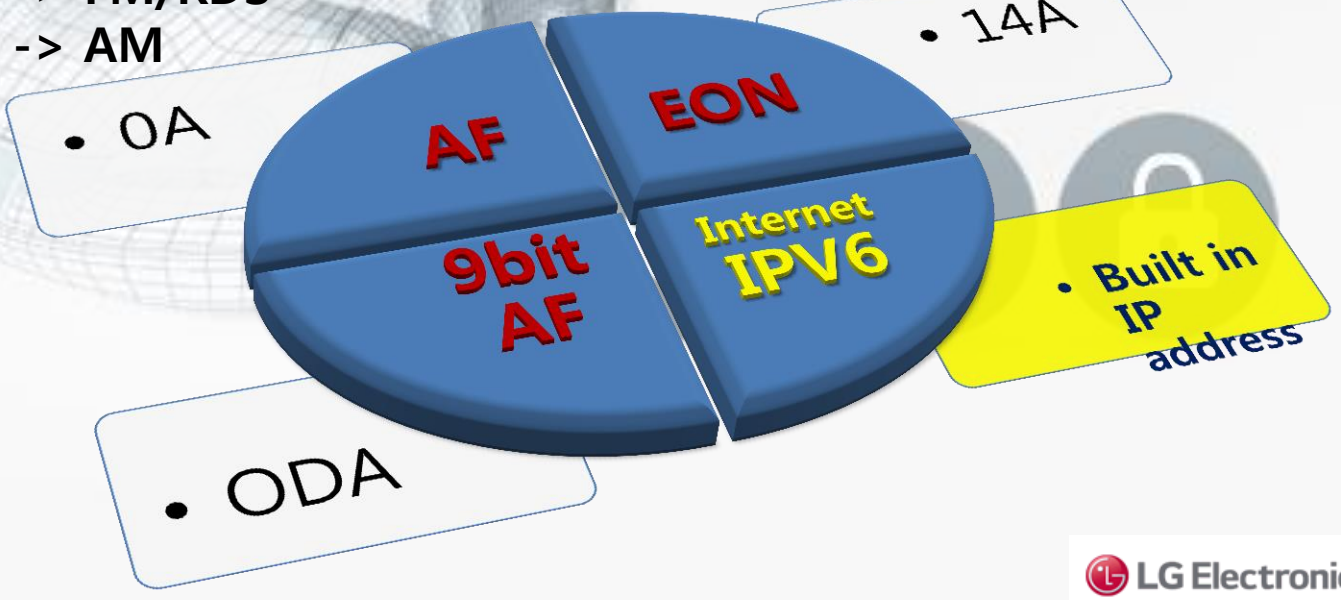
The infotainment system

Can now handle additional data streams with the same decoder software also from internet

RDS2 can follow the program in 4 ways

FM/RDS+RDS2 -> AM ;
FM/RDS+RDS2 <-> DAB ;
FM/RDS2 <-> Internet ;
Internet/RDS2 -> FM/RDS
Internet/RDS2 -> AM



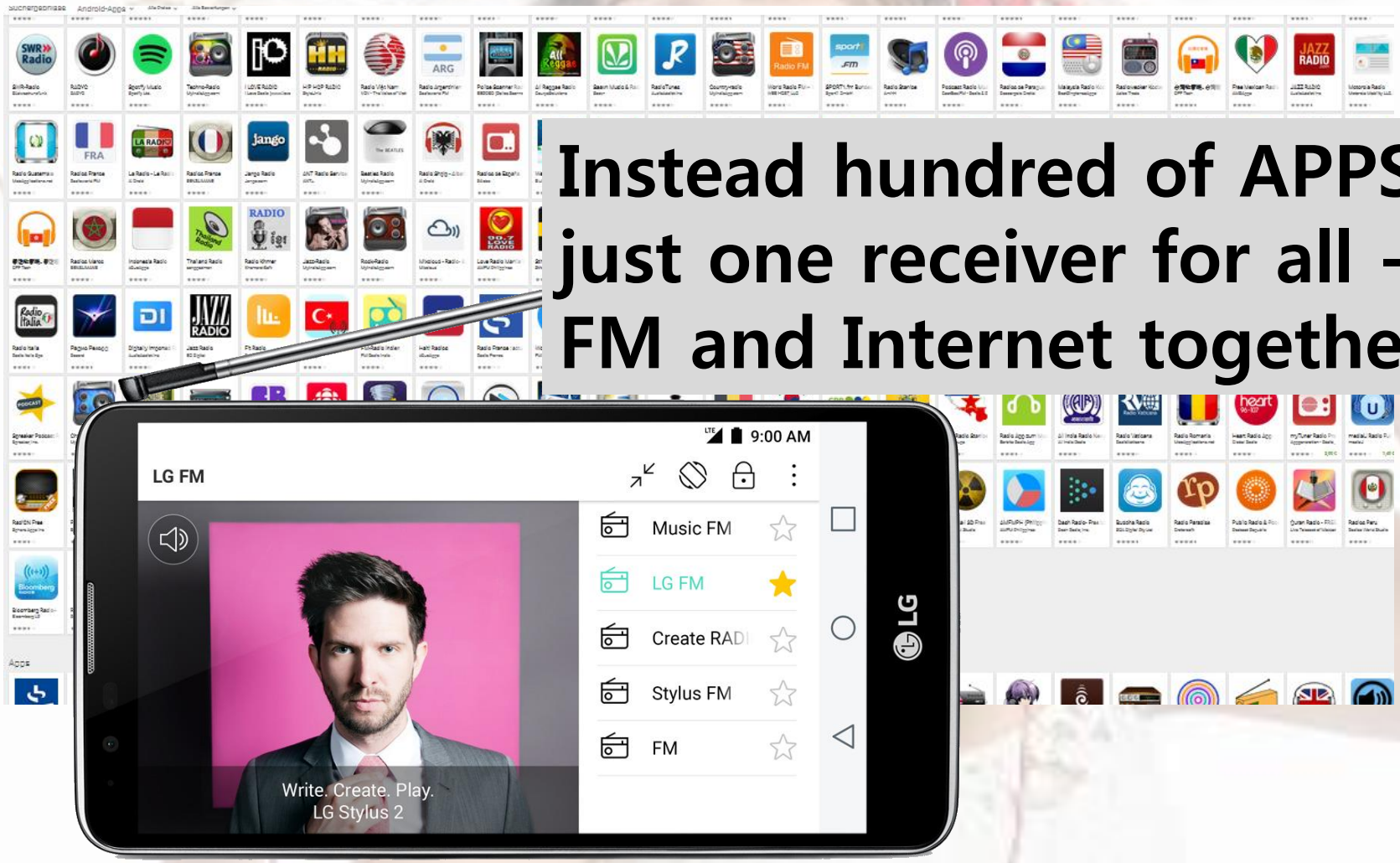
Car dashboard 2020

From car manufacturer required dashboard for the near future:

- **Permanent online**
- **App driven**
- **“Software as product”**
- **Downloads for new functions and updates.**
- **Fully graphical, touch screens**
- **No mechanics.**
- **Seamless switching**

The next radio generation (regardless which technology) must be fit and survive in this electronic “biotope”.
Of course with RDS2 over broadcast and online.

Listener has all in one



Instead hundred of APPS just one receiver for all - FM and Internet together

**The DAB+ network is currently available in 5 metropolitan capital cities (Sydney, Melbourne, Brisbane, Adelaide and Perth). Headphones (included) required to enable DAB+ feature.*

Modern Pocket Radio

***LG* Smartphone with built-in DAB+ digital radio (and of course FM / R**

Next: also with RDS2 FM and Internet and DAB

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Summary:

The industry orders (and strategy) show that FM remains the world's most important broadcast media at least for the next 3-4 vehicle generations.

Digitization is unstoppable, but that business goes into the internet market, new, expensive infrastructure has less chance.

LTE, 4G and 5G creates enough capacity in the phone cells for radio broadcasting over the Internet, but it remains fragmentary on big areas.

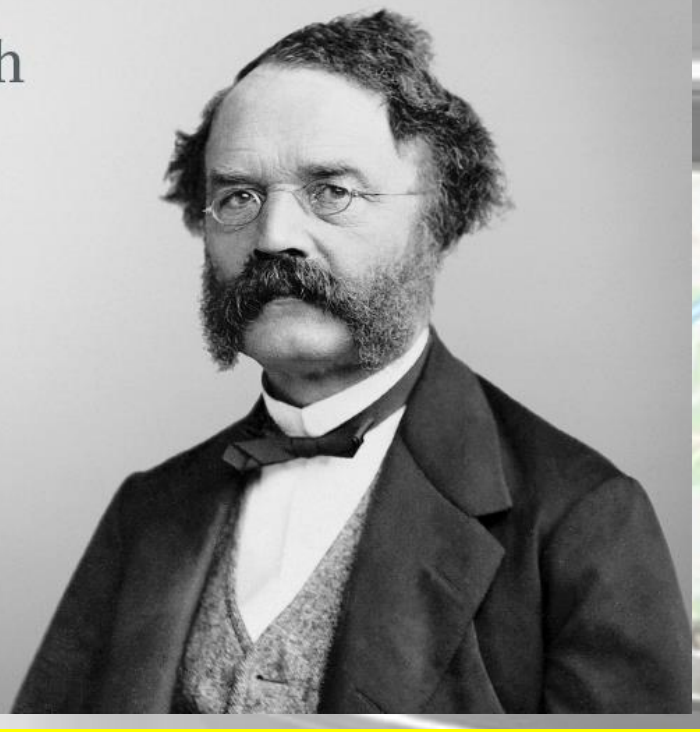
Where additional large data capacities are needed, mobile internet will also be available.

Because RDS2 is able to work cooperative on both (and more) transmission chains we have found together with the ODA technology the best future-oriented solution. Cheap and flexible.

The most important:

„Ideen an und für sich haben nur einen sehr geringen Wert. Der Wert einer Erfindung liegt in ihrer praktischen Durchführung.“

Werner von Siemens
Brief an seinen Bruder Carl, 1865



Ideas have in and of itself a very little value. An innovation's importance lies in its practical implementation.

LET'S DO IT!

Thank You