The international CETECOM group

AECS – eCall
CETECOM proposal for antenna performance test methods for an eCall system in vehicles

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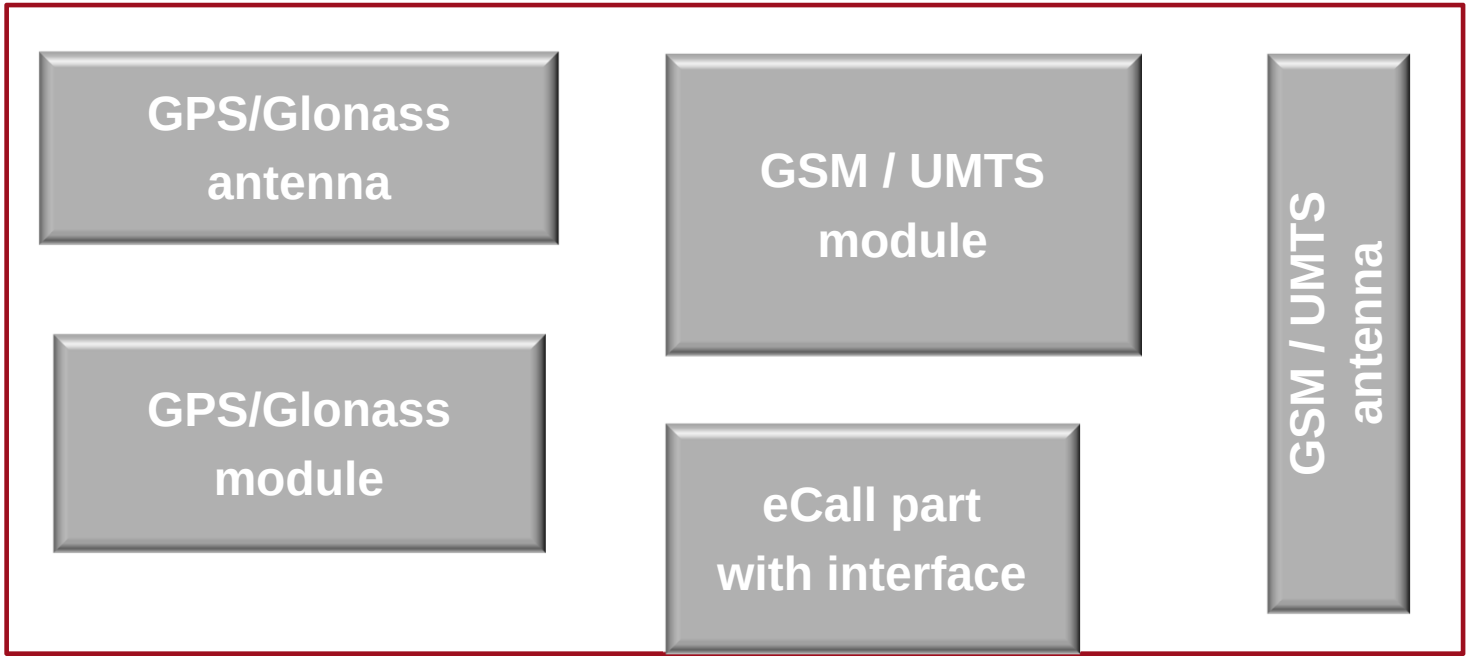
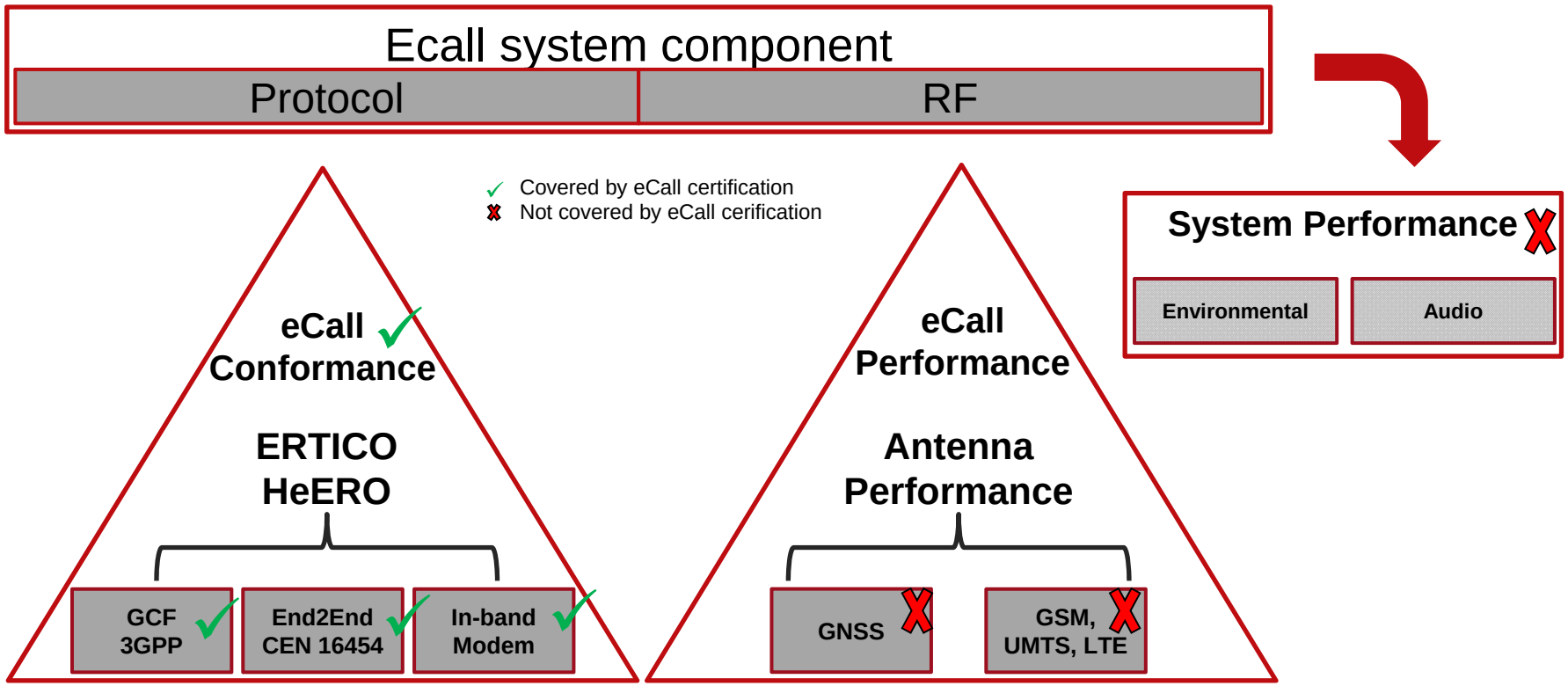
eCall IVS schematic



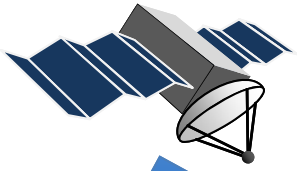
Conformance and Performance tests



Subject: Wireless Link Performance

Why is performance important for eCall?

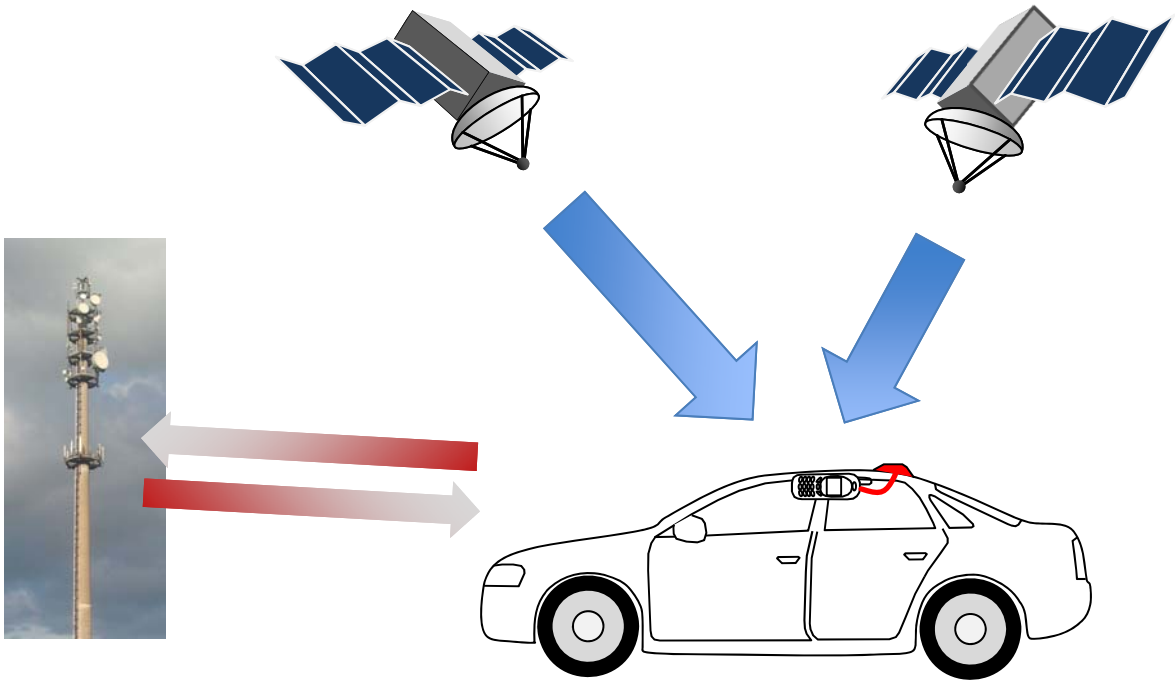
cellular



Satellites

eCall IVS

Subject: Wireless Link Performance(2)

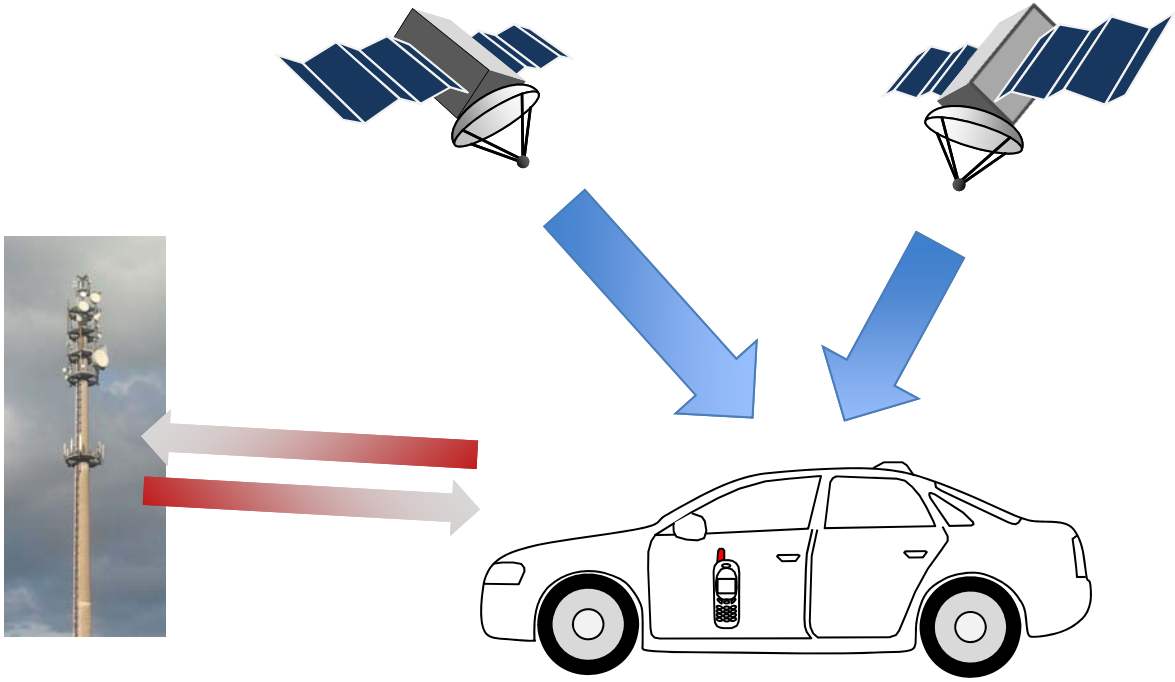


Example: IVS system with e.g. optimal positioned roof antennas

cellular

Satellites

Subject: Wireless Link Performance (3)



Example: IVS system placed within vehicle in a bad situation (antennas blocked by metal)

cellular

Satellites

Antenna Performance

Why is performance important for eCall?

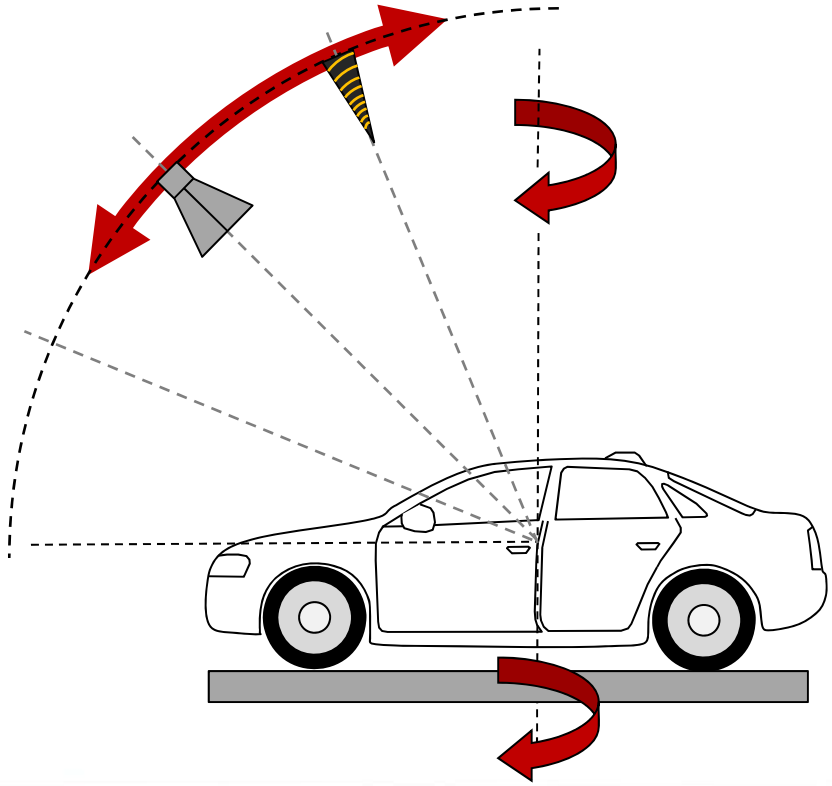
- Mobile Network coverage is very dynamic
- The quality of connectivity at any time is a key factor to fulfill the eCall objectives (saving lives)
- Independent of the position of the vehicle after an accident the **performance** of the antenna shall still be guaranteed

Statement of the problem

What is the target?

- Antenna performance is not covered by current eCall requirements
- Definition of a **minimum antenna performance test** to ensure that the eCall system operates in the majority of all use cases
- Note: Only the wireless requirement is covered by this proposal

Test Principle: Antenna Performance



- Measure link performance for:
  - WWAN = wireless wide area network (GSM, CDMA, UMTS, LTE …)
  - Satellite based positioning system (GPS, Glonass, Galileo …)
- Rotate car (e.g.: 0º … 360º)
- Rotate two different antennas (e.g. 0º…90º in 22.5º steps)

Setup: Semi Anechoic Room (SAR)

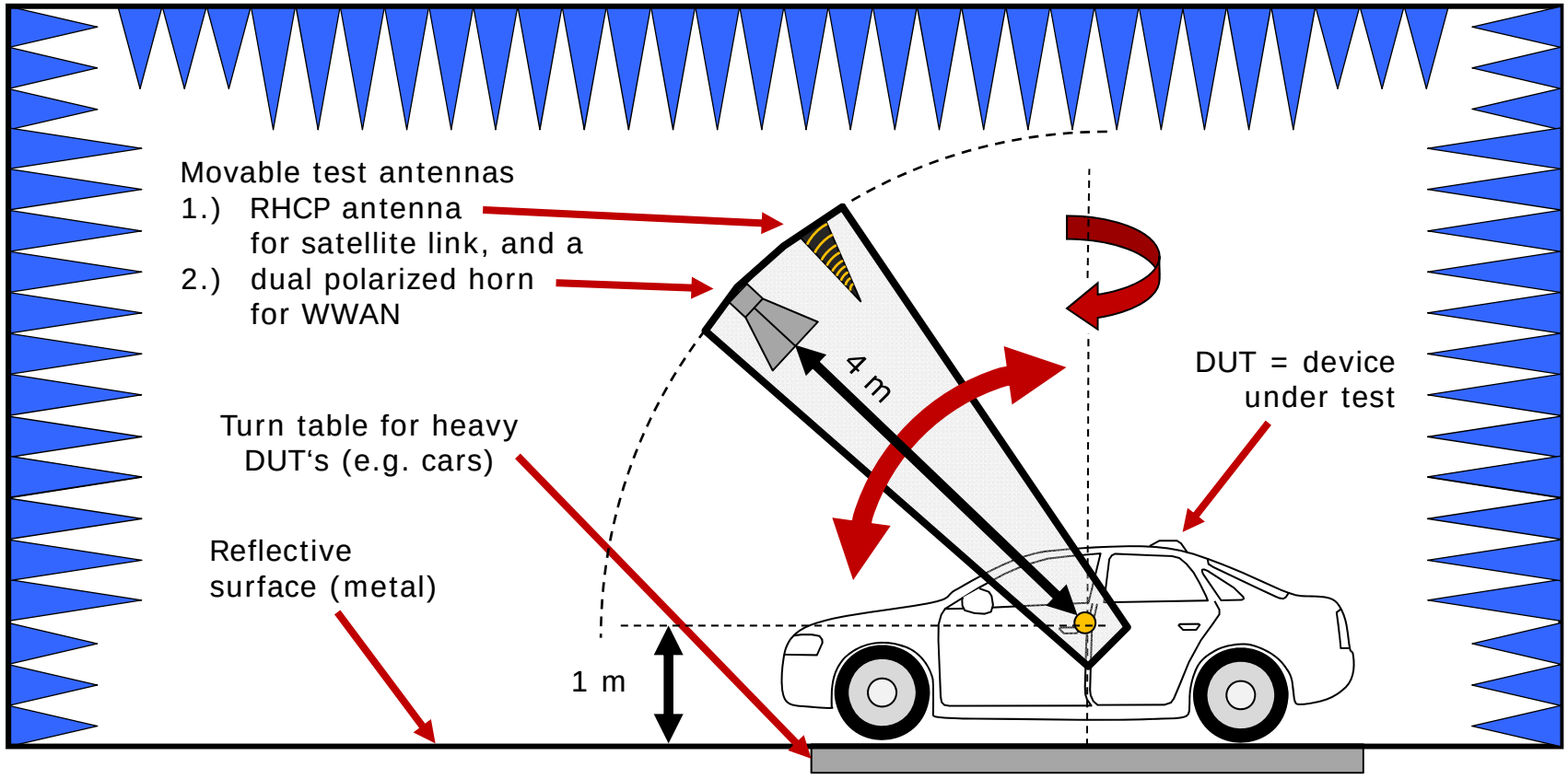
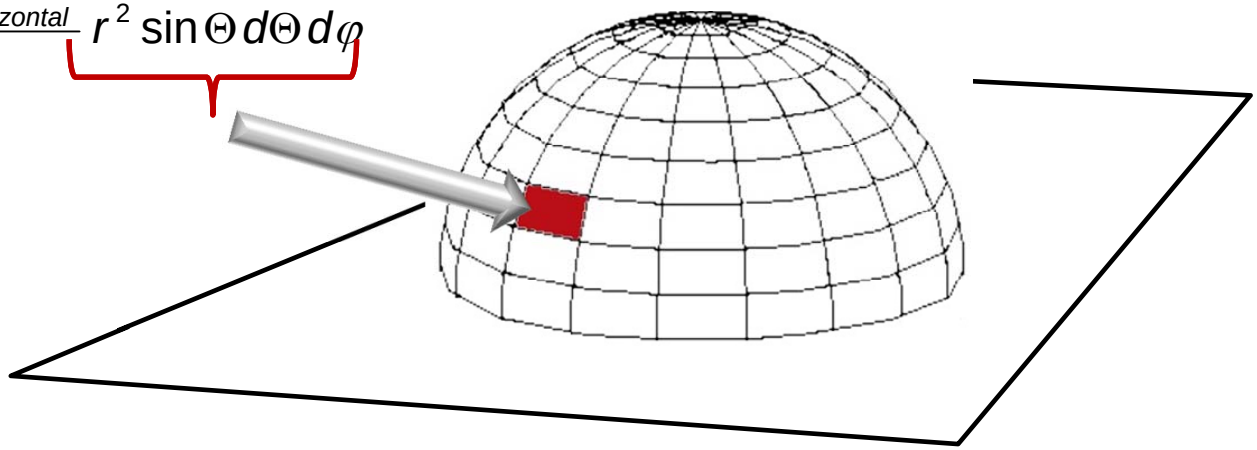


Figure of Merit: UHTRP and UHTIS

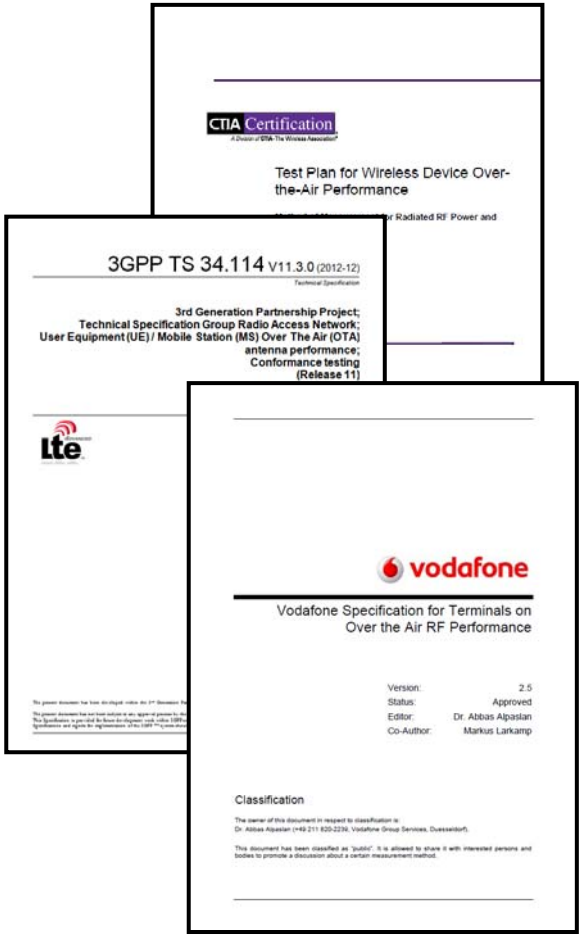
1. Upper hemisphere total radiated Power (**UHTRP**) and Isotropic Sensitivity (**UHIS**)
2. WWAN bidirectional: UHTRP and UHTIS
3. Satellite: One direction only: UHTIS

$$TRP = \oiint \frac{E_{vertical}^2 + E_{horizontal}^2}{Z_0} r^2 \sin\Theta \, d\Theta \, d\varphi$$



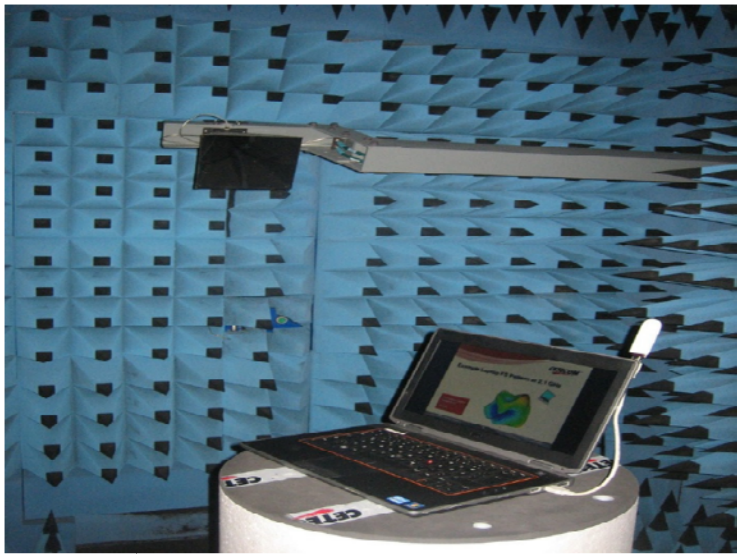
Existing Public Standards

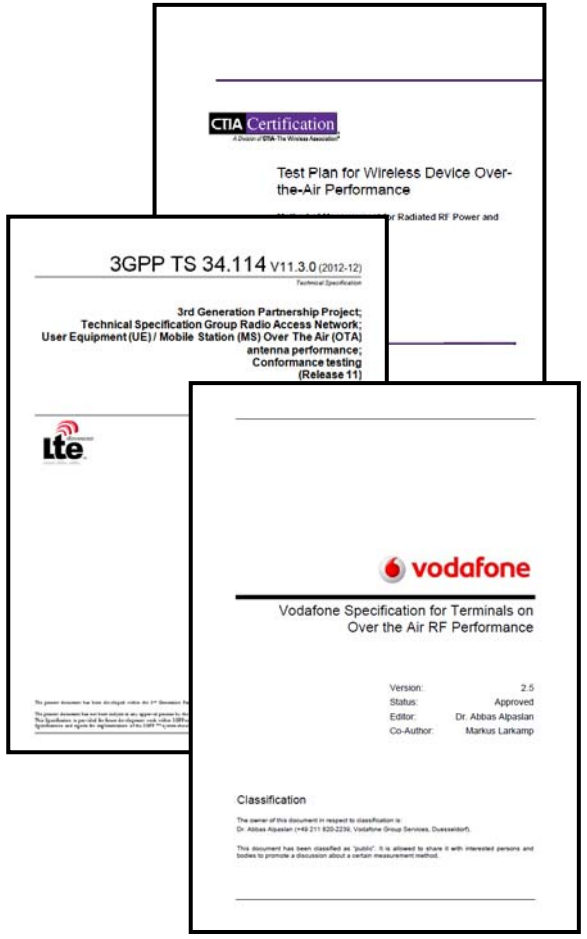
1. **USA**: CTIA Test Plan
   GPS, GSM, CDMA, UMTS, LTE
   US frequencies only **but** no “car use case”
2. **Europe**: 3GPP TS 34.114
   GSM and WCDMA only
   but no GPS and no “car use case”
3. **Worldwide**: Vodafone Specification
   GSM, UMTS, **but** no GPS, no “car use case”
   therefore self-interference



➡ The existing standards are providing good technical references but a slightly update is needed for the use case of eCall in cars

Existing Public Standards





Conclusion

- Antenna performance not covered by eCall requirements
- A technical standard for eCall is currently not available
  - Technical standard needs to be written
- CETECOM has long term experiences in
  - **cellular** technology
  - **antenna** technology
  - **validation** of standards

Thank you very much for your attention …

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