Potential Broadband RFI In UHF Band

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Motivations

- **Regulatory agencies across the world are looking into repurposing UHF channels for broadband wireless networks.**
- **As a result, there will likely be broadband RFI at frequencies of RTPGE concern.**
- **Existing RFI immunity standards such as ISO 11452 only include narrowband RFI test cases.**
- **Mitigating broadband RFI that is dynamic in center frequency and BW can be challenging.**

In-Vehicle Broadband RFI

- There is a growing use of wireless devices in vehicles
  - Mobile phones, mostly above 746M and, in rare occasions, around 450M, <=2W
  - Wifi, 2.4G, 5G, <1W (AP),
  - Bluetooth, 2.4G, <=100mW

- Mitigation of broadband RFI, if falling into RTPGE signal bandwidth, can be challenging.
  - A transmitter with EIRP of 2W generates 26v/m field strength at distance of 0.3m.
  - Broadband wireless communications can dynamically change both center frequency and bandwidth.

Regulatory Trend in UHF Band

- Growing regulatory activities across the world to repurpose some of the UHF band for the use of broadband wireless networks, mainly mobile networks.
  - FCC has a plan to free UHF channels above 548MHz or even above 512MHz (*see FCC 12-118*).
  - Many other countries have similar plans.

Discussions & Conclusions

- Future mobile networks may use frequencies as low as 512MHz.
- It's preferred to consider signaling schemes with spectrum within 500MHz to avoid RFI from mobile communications in the future.
  - To avoid PAM-2.

Appendix

- RFI to in-vehicle cables with frequency less than 1GHz (free-space calculation).

Aggressors	FM radio	TV Broadcasting	Cell phone	Two-way radios	Amateur Radio
Distance	>300m	>500m	< 0.3 m	<0.3 m	10m
EIRP	100kW	1000kw	2W	5W	1500W
Frequency Range	87.5M~108 M	VHF (54-88M, 174-216M). UHF (540-800M).	LTE: 746-793M GSM 824-960M	151M, 461-468M	LF to EHF: 28-29.7M 50-54M 144M, 220M, 420-450M
Modulation & BW	10% FM, BW=200Khz	BW=6M	BW=0.2-10M	BW= 12.5K(UHF) 25K (VHF)	<=6M, mostly less than 10khz
Field strength	<6v/m	<11v/m	26v/m	40 v/m	<21v/m