

Anforderungen an das taktile Internet

Gerhard P. Fettweis – Vodafone Chair Professor



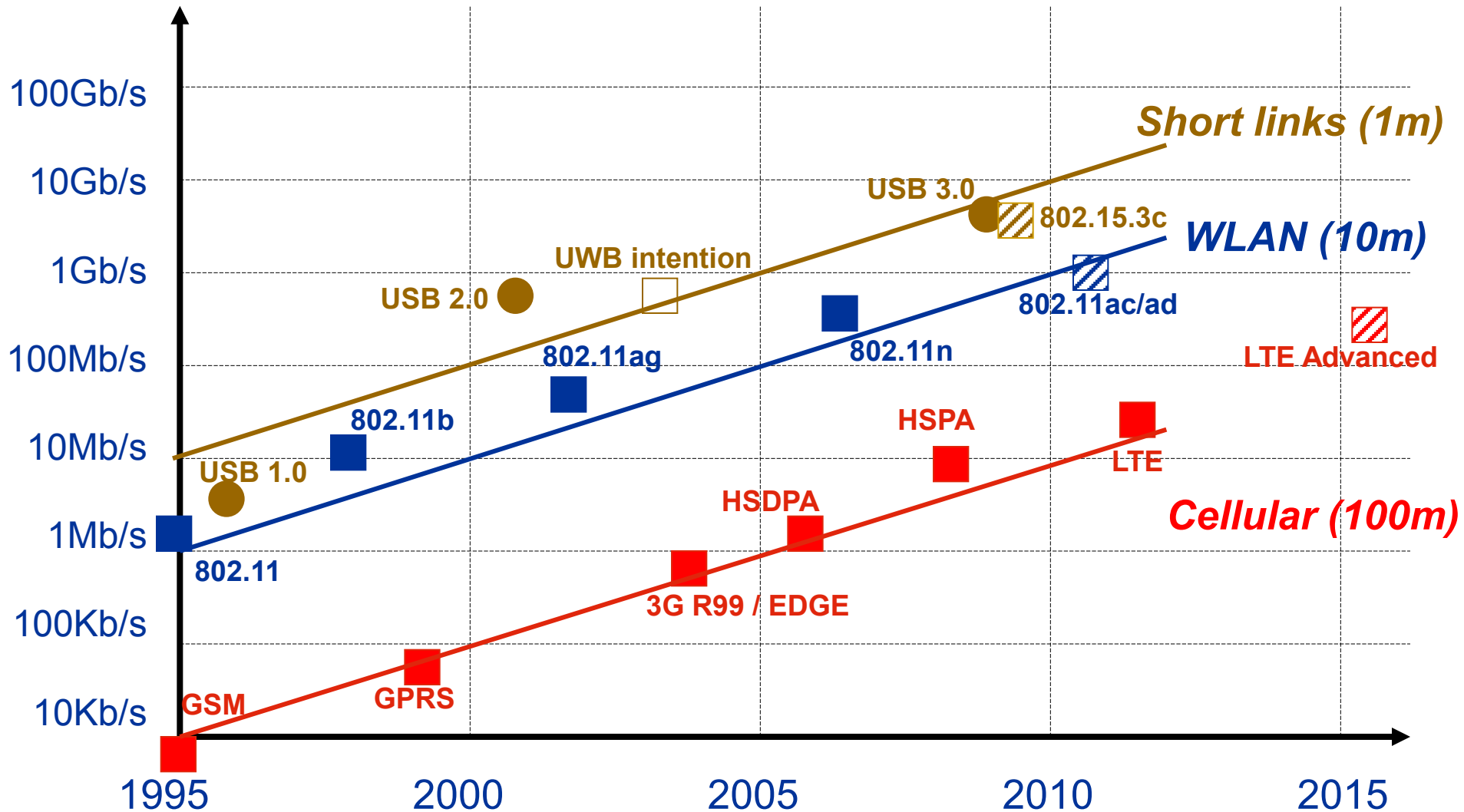
Wireless2020 – 01 Oct 2013

G. Fettweis

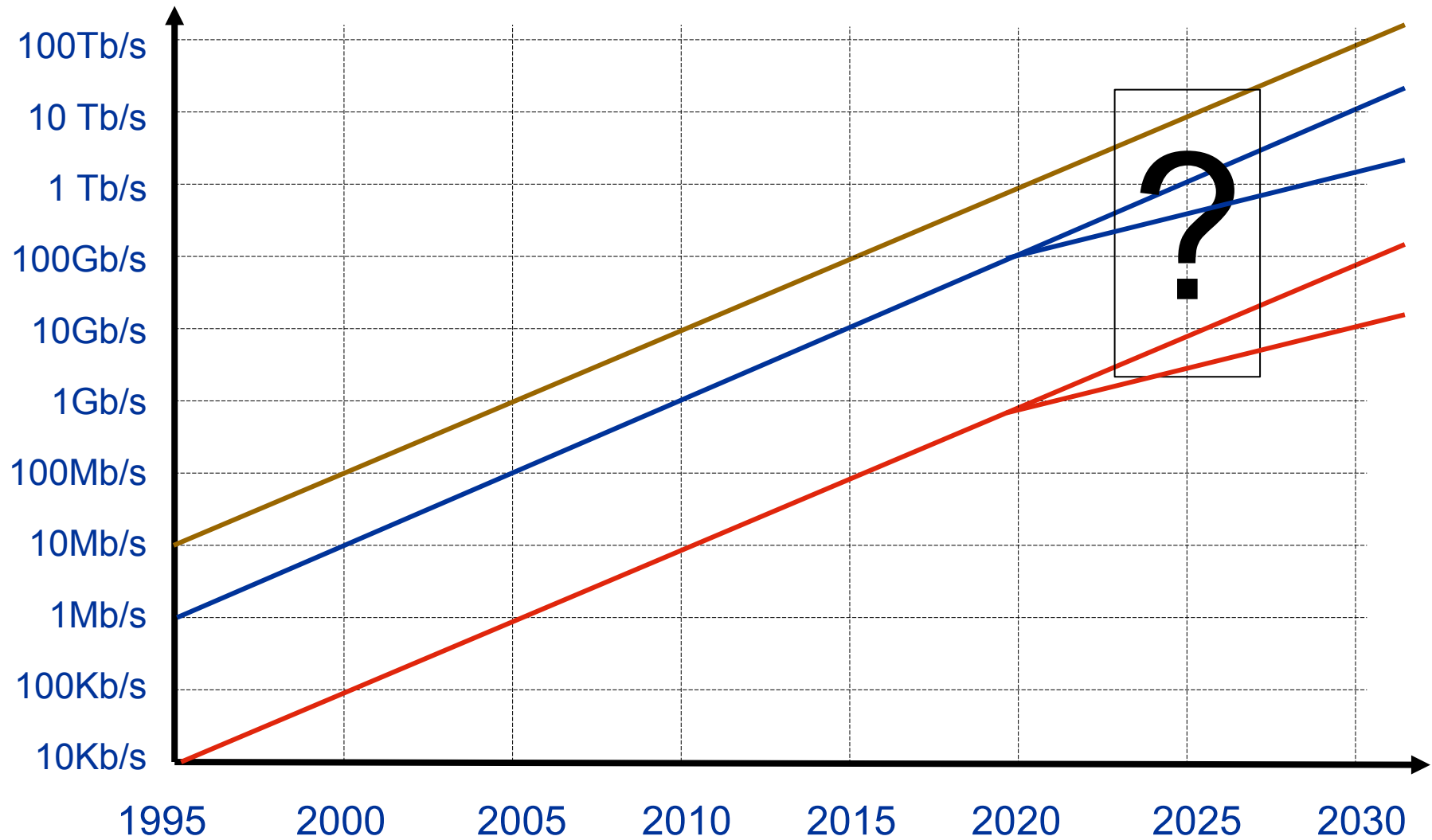
A 5G Wireless Communications Vision , 2012-12-15, Microwave Journal

www.microwav ejournal.com/articles/print/18751-a-5g-wireless-communications-v ision

The Wireless Roadmap



>2020 Outlook



2005/4/4 – Via Della Conciliazione





Ad-Hoc Mobile

“Free-Viewpoint Video”

**→ Enable real-time view beyond
own point of view**

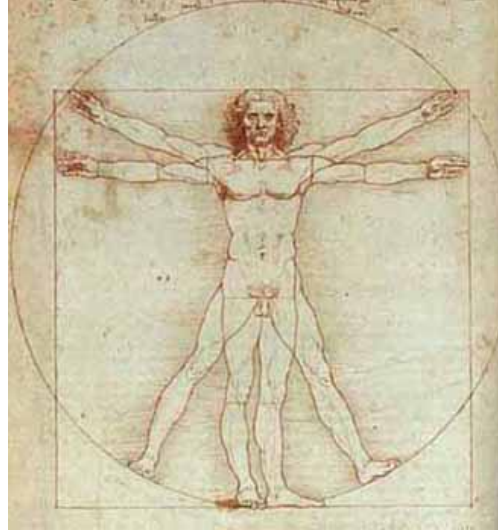


<http://googlesystem.blogspot.de/2009/12/google-goggles-mobile-visual-search.html>

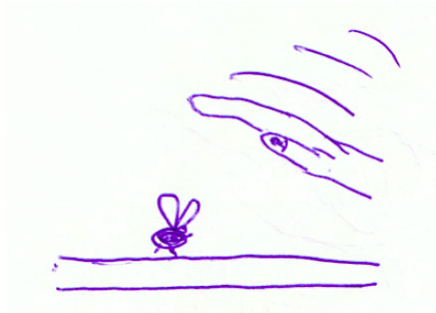
Human Reaction – How Fast is Fast?



http://i.cdn.turner.com/si/multimedia/photo_gallery/1108/famous.false.starts/images/01.bolt.jpg



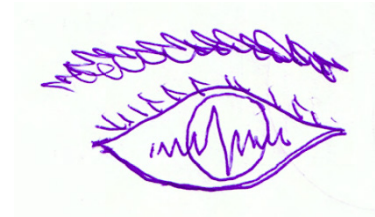
1 sec



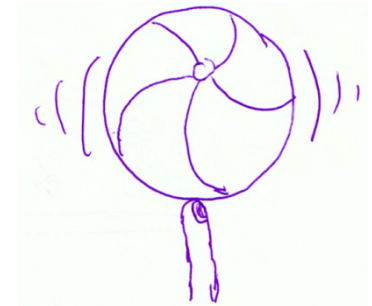
100ms

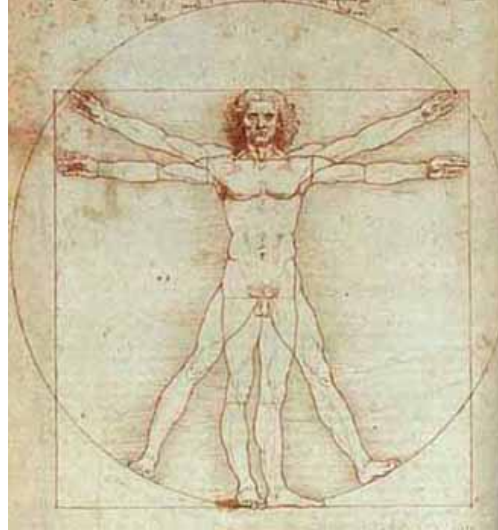


10ms



1ms





1 sec



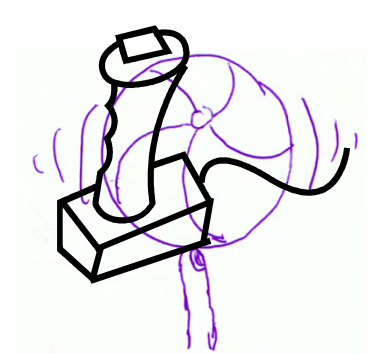
100ms



10ms



1ms



Gaming...



http://popular-pics.com/Cool_World_Record_LAN_Event_Computer_Pictures__5
<http://gametaffy.com/imho-the-lan-party/>



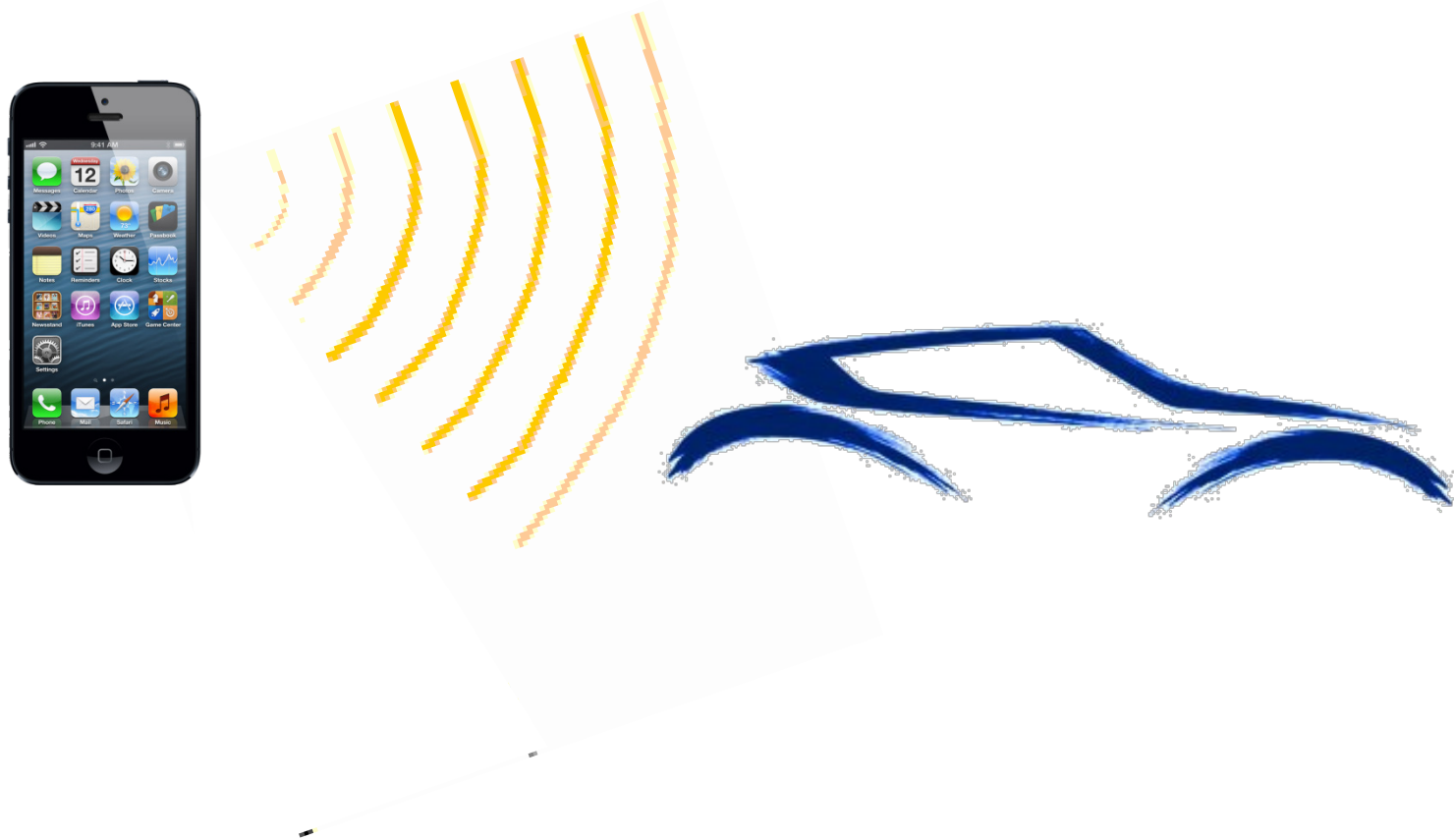
<http://www.germanpulse.com/wp-content/uploads/2013/02/HerbertGroenemeyerGuitarPhotoByAliKepenek.jpg>

i-Flight

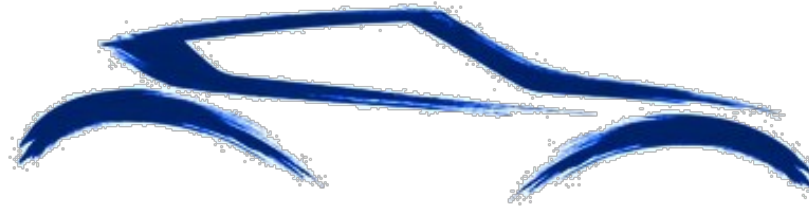


http://ds_product_photos.s3.amazonaws.com/large/9756.jpg

Remote Driving 2.0



- 1ms examples of today's cars: ESP, ABS



- Tomorrow: platooned ESP & ABS



Traffic Control



Wireless Airbags

Crash to impact:
10-15ms

- Crash sensor
- Trigger
- Air bag



Exoskeletons – “Power Limbs”



http://news.cnet.com/8301-17938_105-57532729-1/nasa-exoskeleton-suit-is-half-way-to-iron-man/



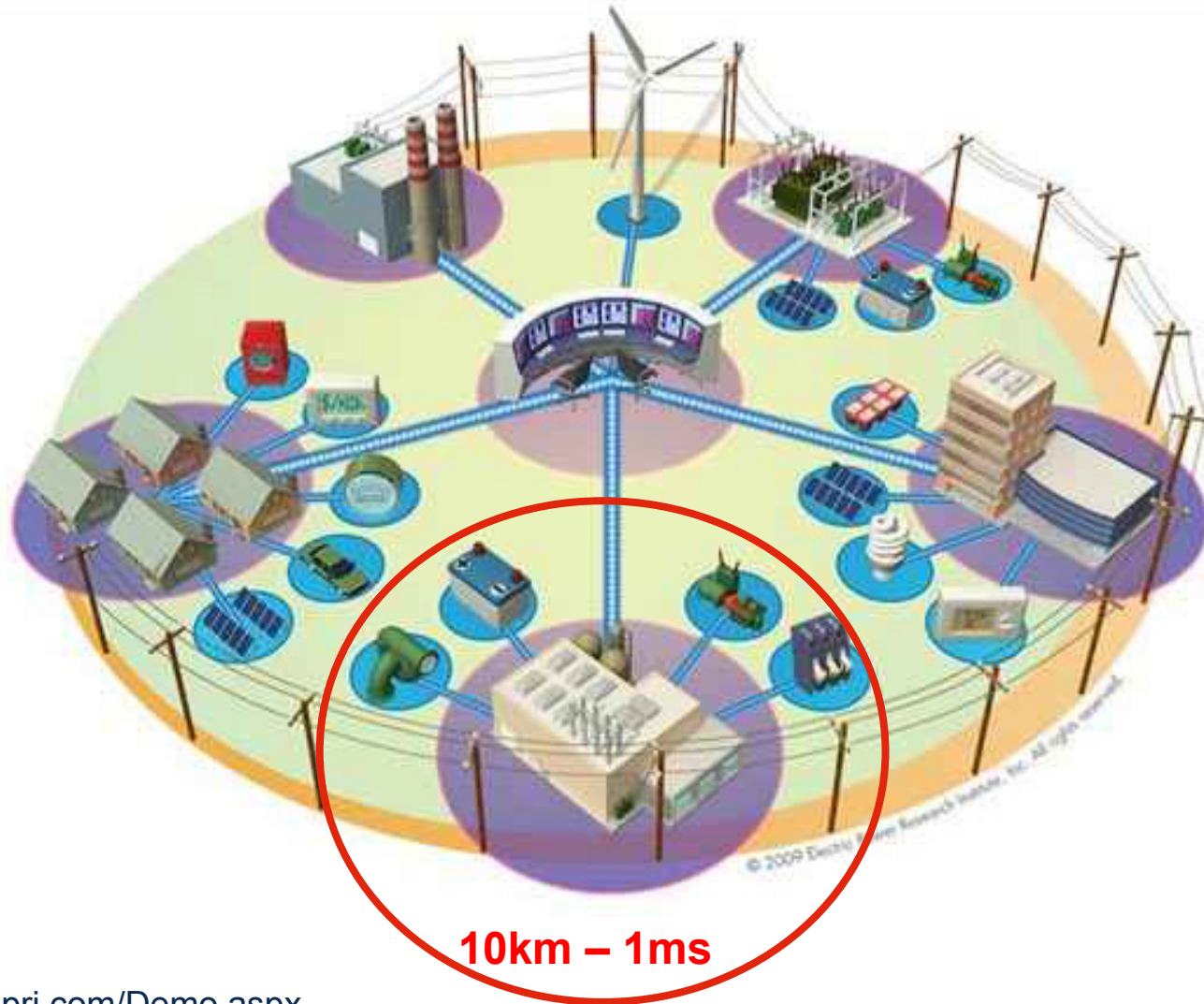
http://www.augsburg.de/fileadmin/www/dat/fotoservice/wirtschaft/kuka/kuka_1.jpg

Fly By Wire





<http://www.spox.com/de/sport/olympia/0807/Artikel/Terminplaene/zeitplan-kanu.html>





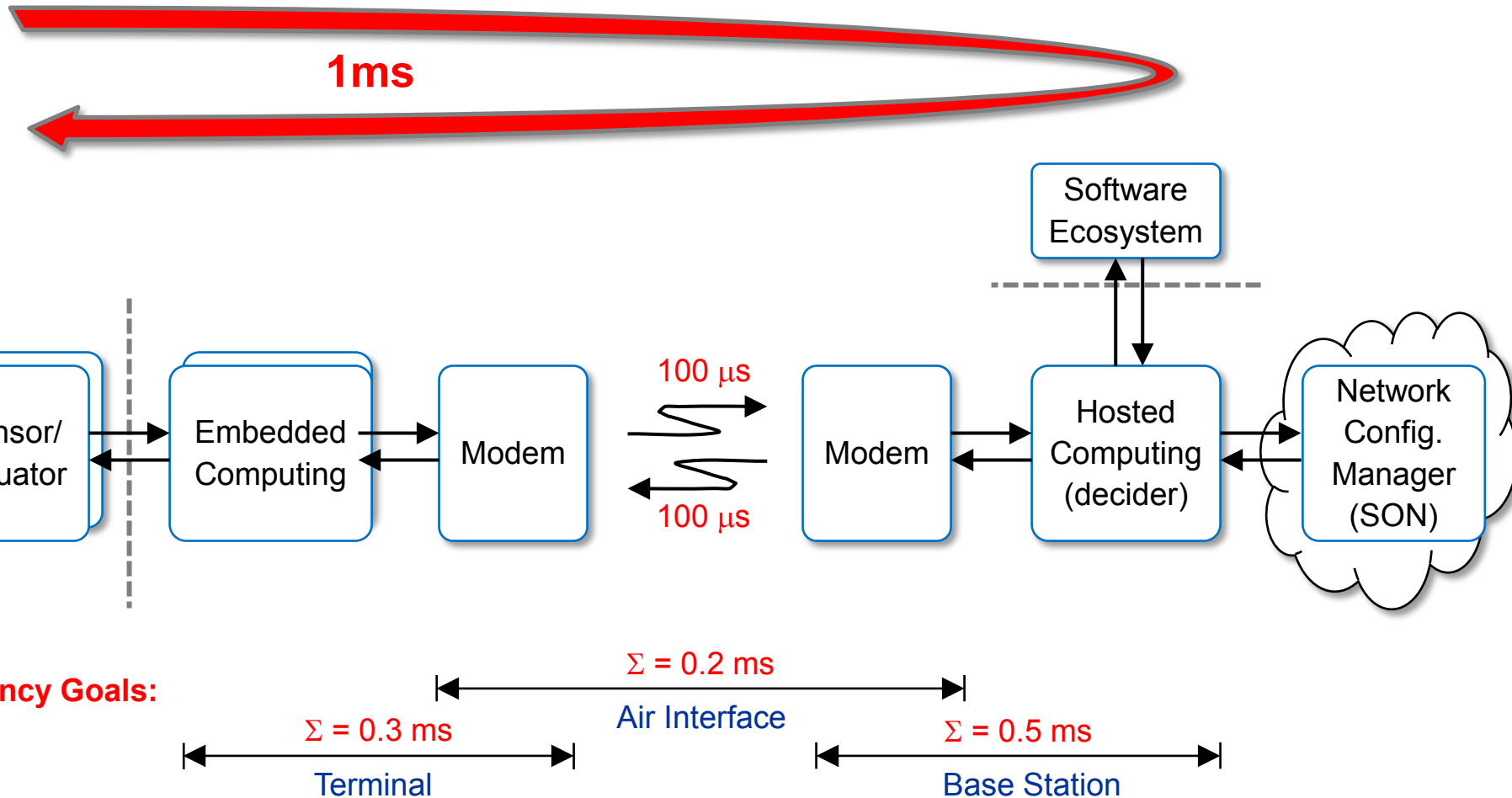
Content
Communications

Steering &
Control
Communications

Health & Care
Traffic
Sports
Education
Manufacturing
Games
Smart Grid

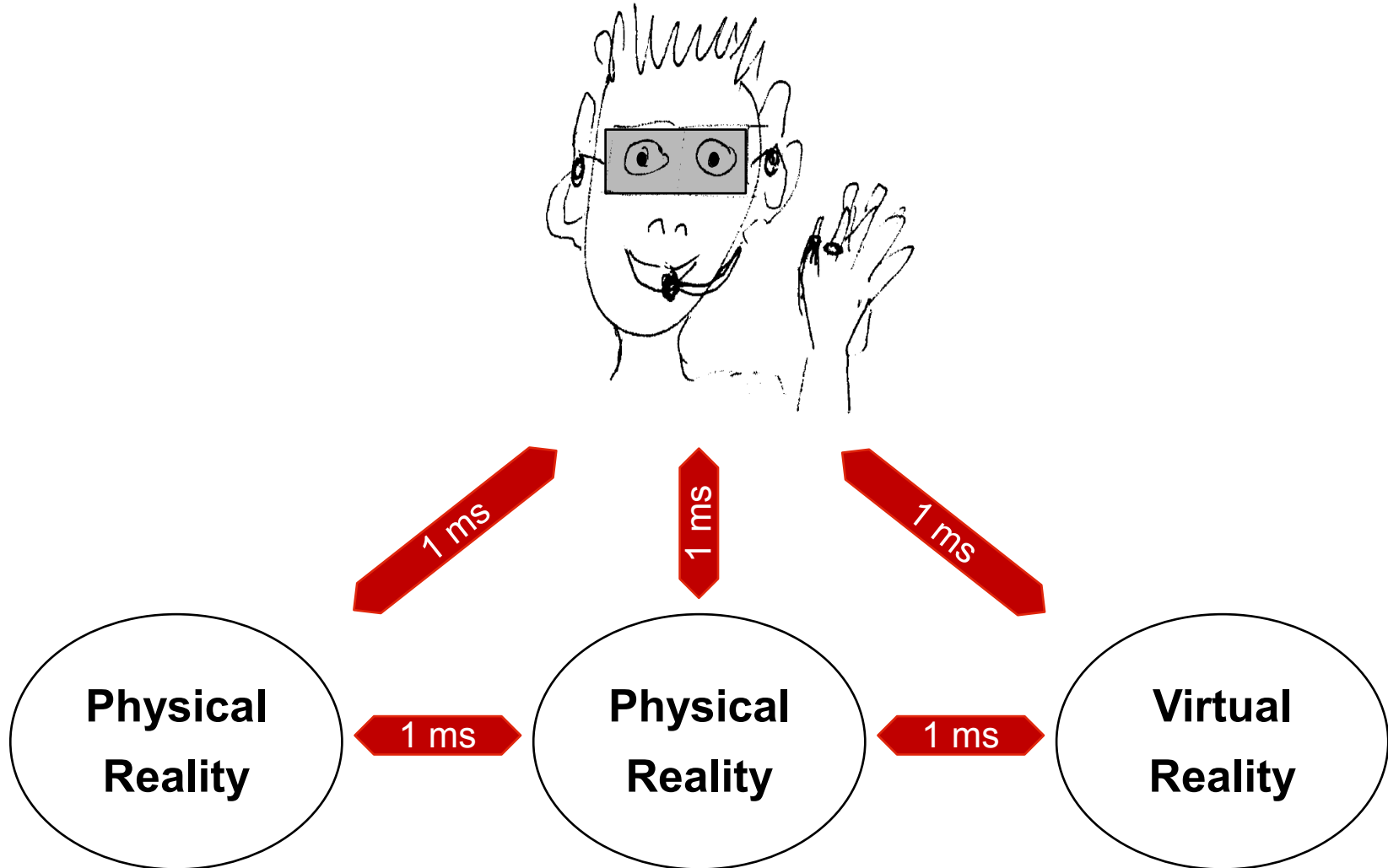
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Tactile Internet - 1ms Impact



TACTILE INTERNET

ADDRESSING THE CHALLENGES





- Accountability & Archiving



- Failure Resilience



- Authorization



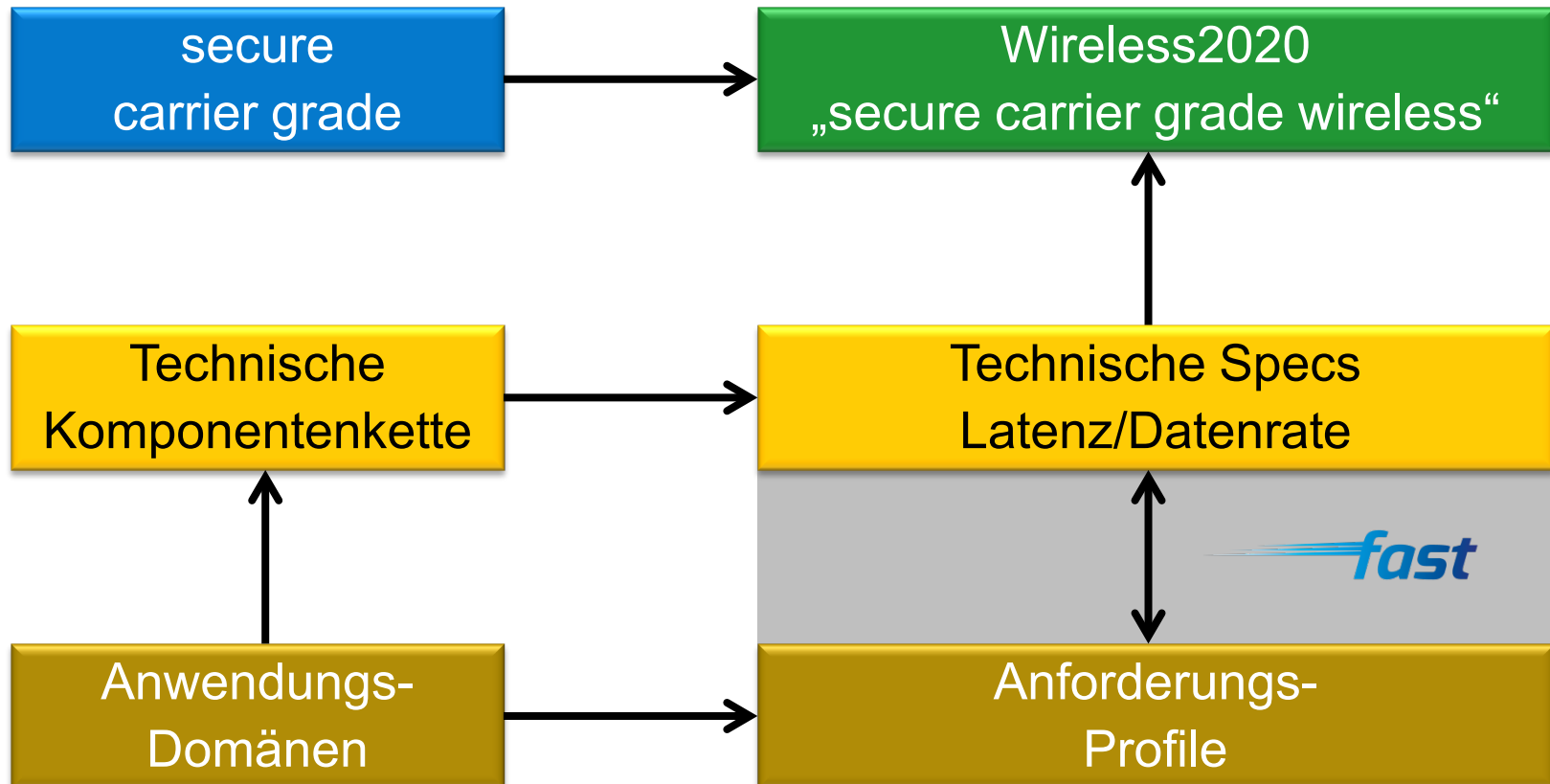
- Attacker Resilience

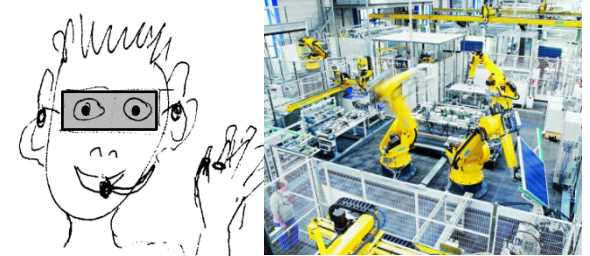


- Eavesdropping Security

carrier grade

secure





W2020
+ Steer/Control
+ Tactile Internet



4G – today
+ Video Conferencing
+ 3D Graphics



3G – 2002
+ Data
+ Positioning



2G – 1992
Voice
Messages



vodafone

Thanks to Vodafone for 18 years of continued support !

www.vodafone-chair.org

<http://www.youtube.com/watch?v= VXEPzQgpok>

cfaed.tu-dresden.de

www.tu-dresden.de/sfb912

www.twinlab3d.org