Big Data for Smart Cities – Connected Vehicles in the Wireless World
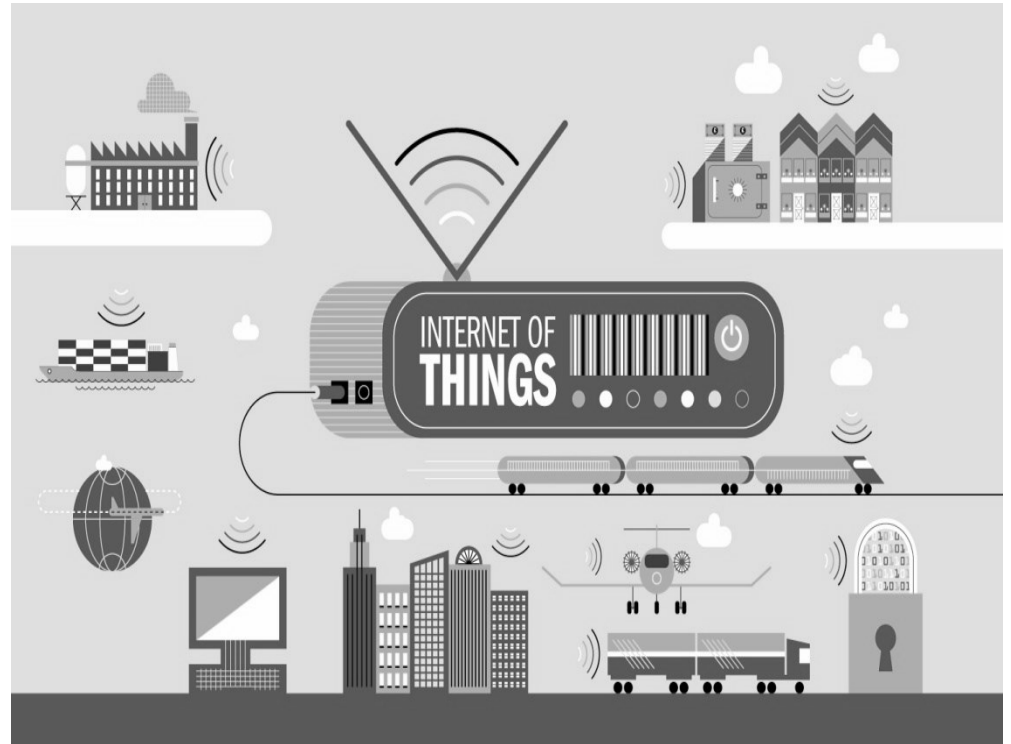
Dr Nigel Jefferies
WWRF Chairman
Huawei Technologies

3rd March 2016

Will IoT trigger next industrial revolution?

Size of the IoT opportunity

❖ Clues from the rise of **Internet** and **mobile communications**

❖ 1995 vs. 2015

  ➢ World's population: 5.7 billion (1995) vs. 7.3 billion (2015),   **1.28 times**

  ➢ Online population: 35 million (1995) vs. 2.8 billion (2015),   **80 times**

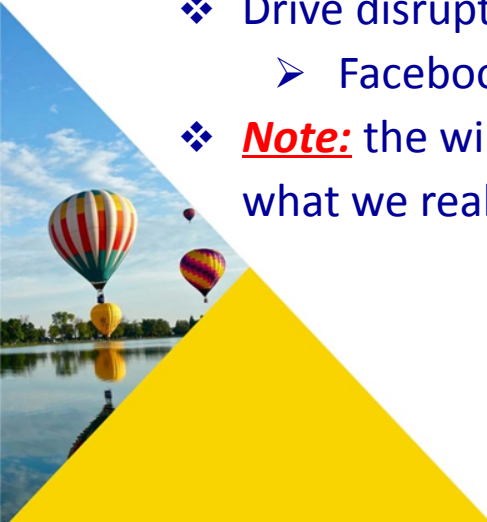 ➢ Mobile phone users: 80 million (1995) vs. 5.2 billion (2015),   **65 times**

❖ Profound changes to the landscape of tech industry and society

❖ Drive disruptive new businesses
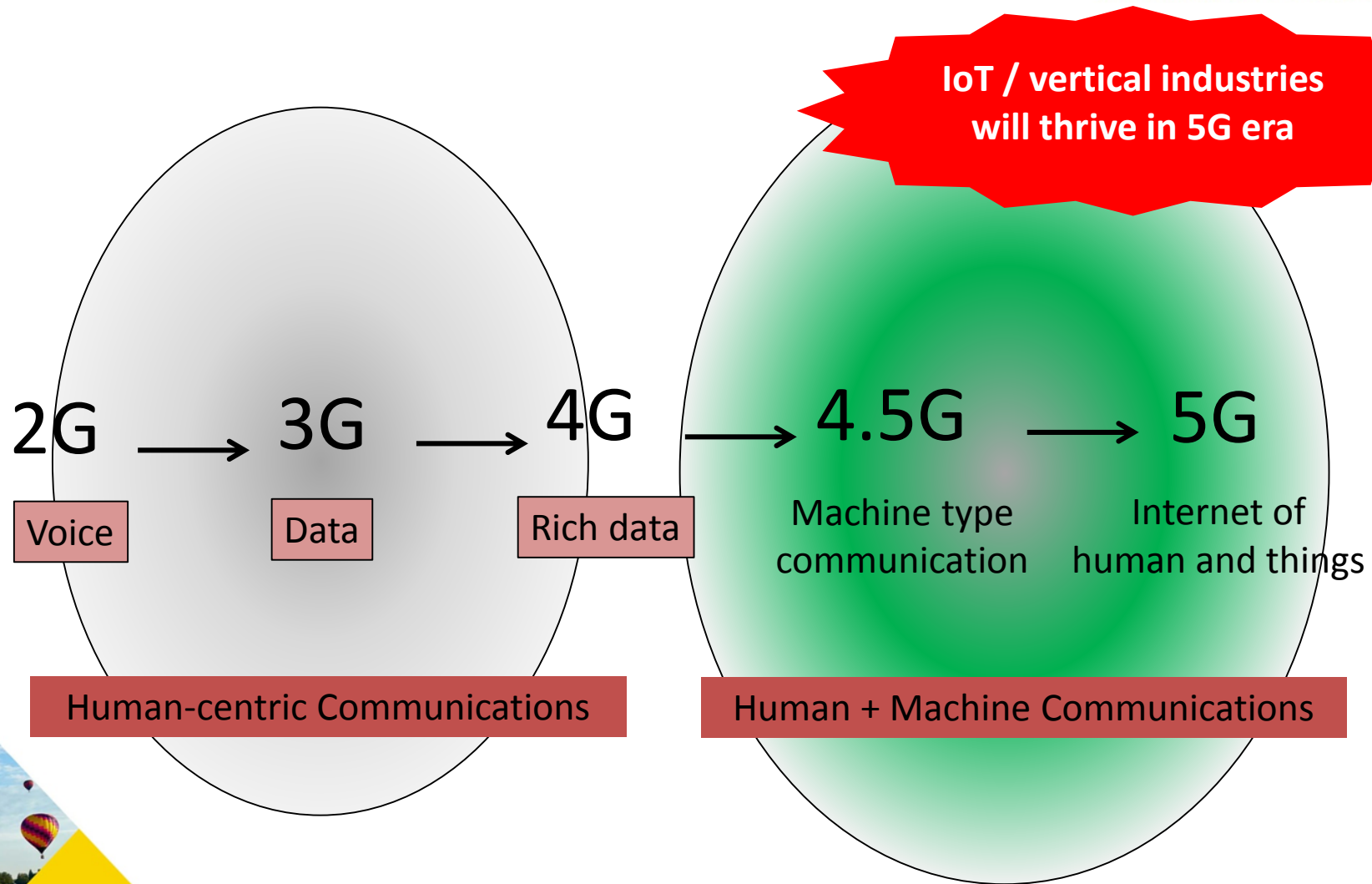
  ➢ Facebook, Twitter, Uber, airbnb, …

❖ *Note:* the wildest projections made 20 years ago (1995) are massively under what we really have today (2015)

5G: enabling internet of human and things

WIRELESS WORLD
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IoT / vertical industries will thrive in 5G era

2G → 3G → 4G → 4.5G → 5G

Voice — Data — Rich data

Machine type communication

Internet of human and things

Human-centric Communications

Human + Machine Communications

Connected vehicle services evolve along with communications

WIRELESS WORLD
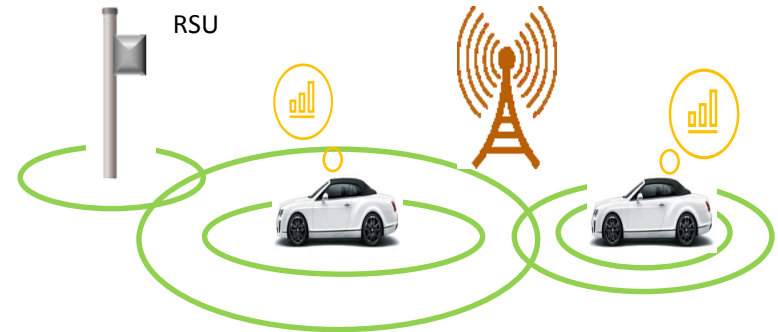**RESEARCH FORUM®**
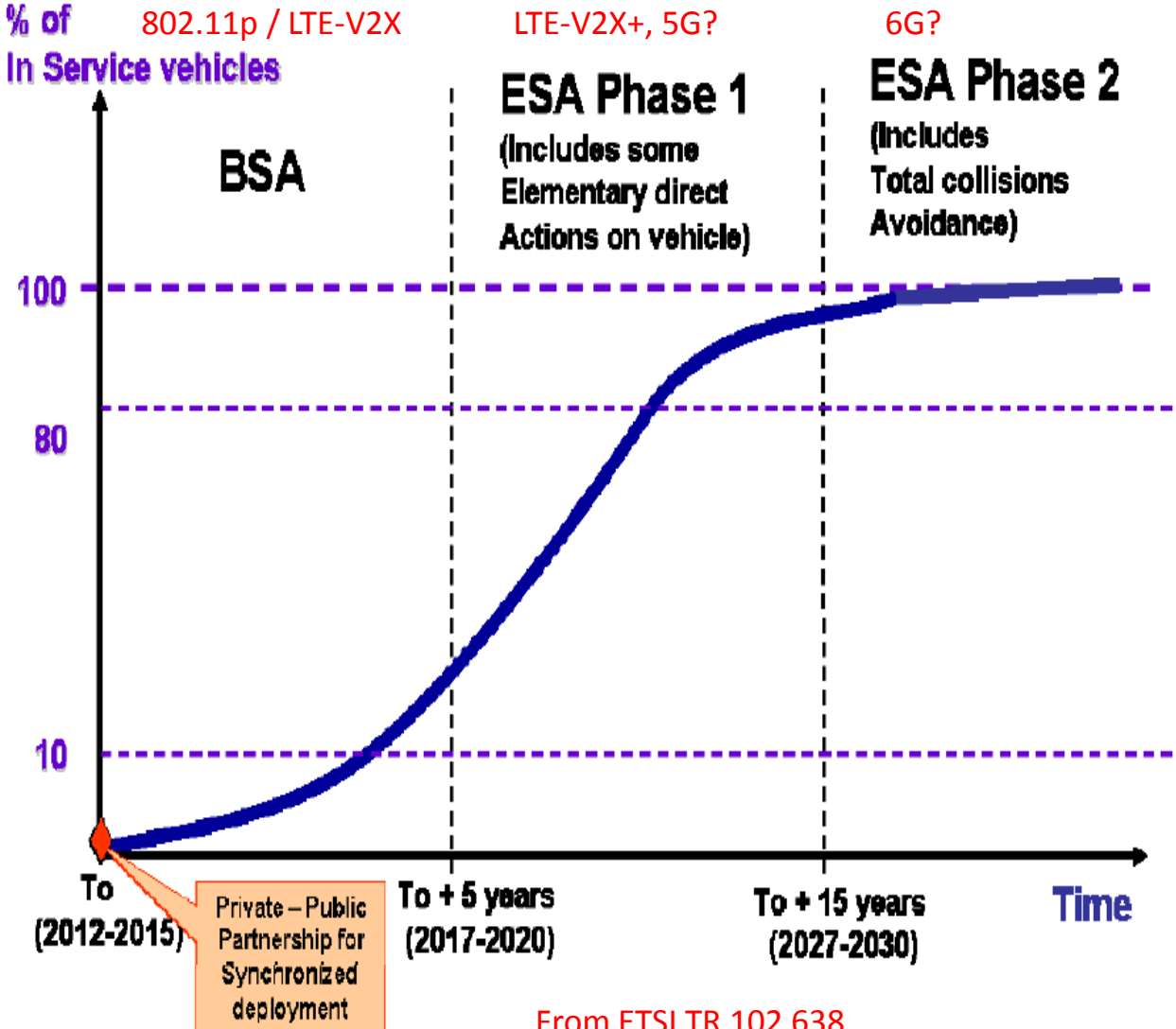
From ETSI TR 102 638

Two different services with different communication requirements
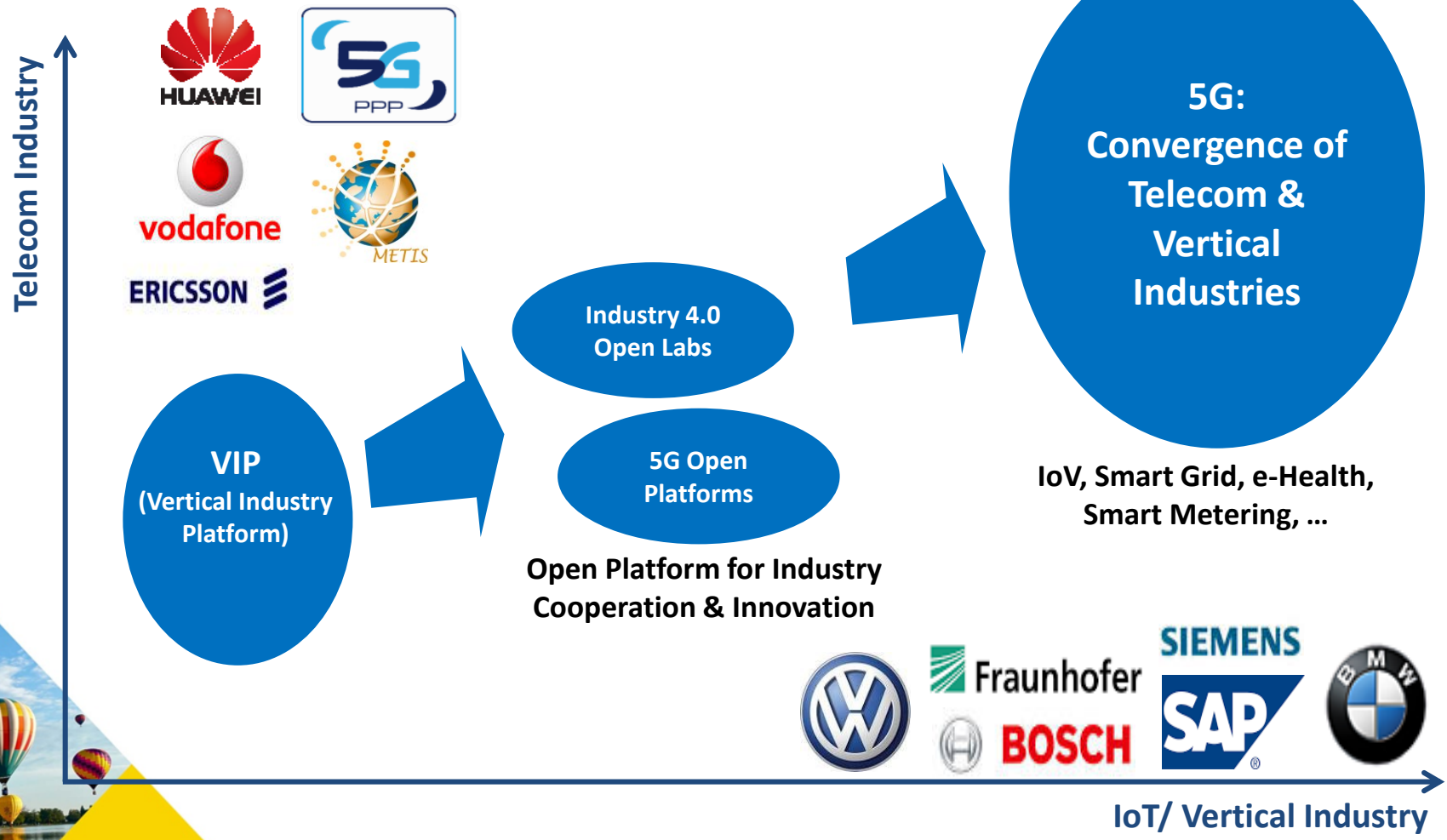
Telematics
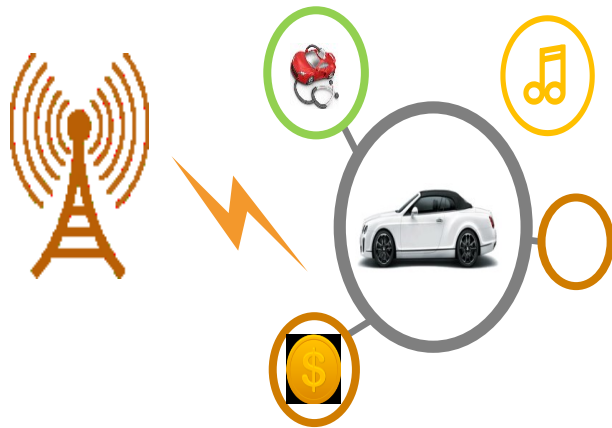
- **Communication traffic model and requirements:**
  - Infrequent transmission
  - Large coverage
  - Latency insensitivity
- **Underlying technologies:**
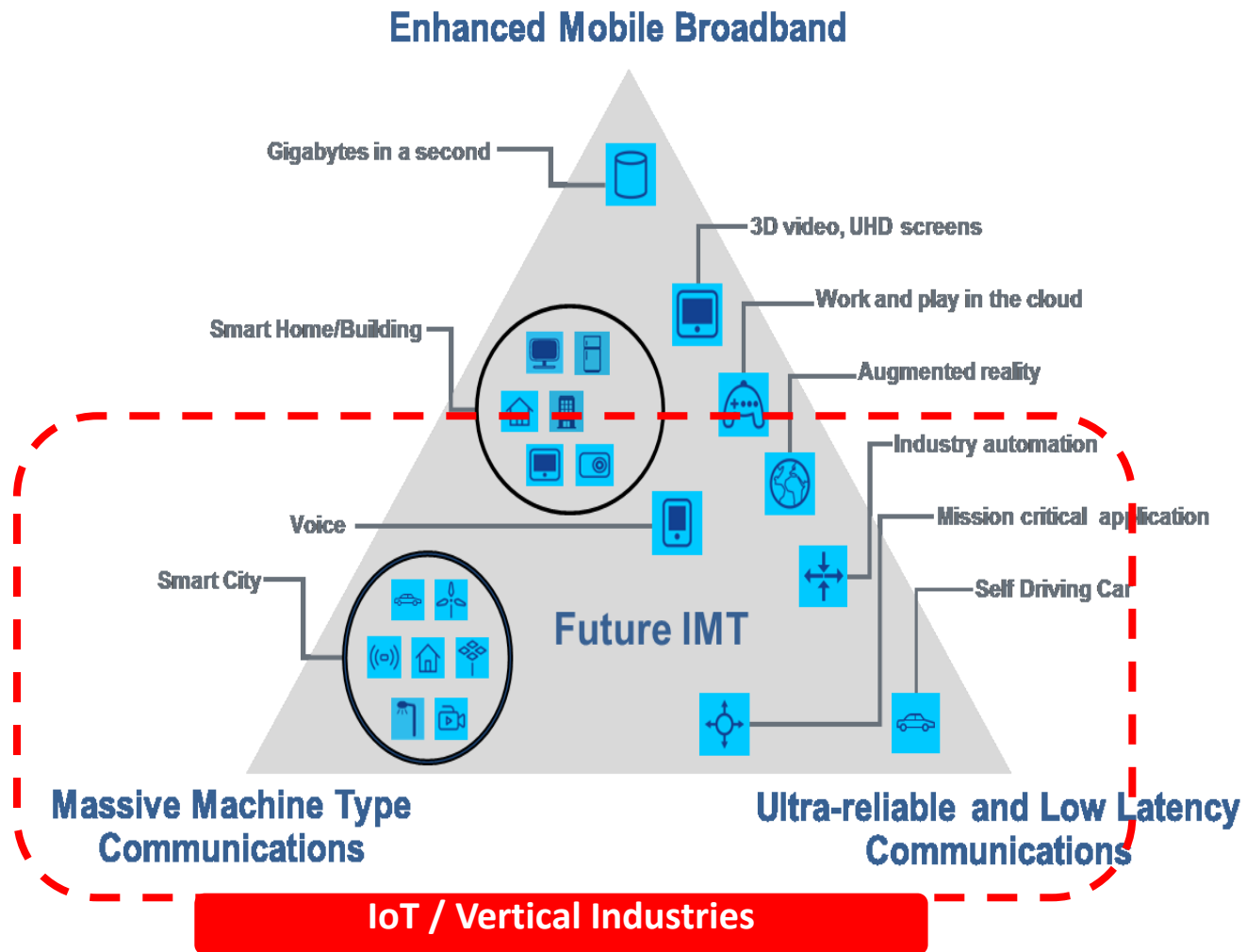 - Cellular technologies (2G/3G/4G)

V2V/V2I ITS Road Safety

RSU

- **Communication traffic model and requirements (for BSA stage):**
  - Frequent transmission (1~10Hz)
  - Short range communication (hundreds of meters)
  - Low latency requirement (<=100 ms)
  - High reliability
- **Underlying technologies:**
  - 802.11p, LTE-V2X and future 5G..

5G: convergence of telecom & IoT/ vertical industries

WIRELESS WORLD
RESEARCH FORUM®

Telecom Industry

HUAWEI

5G PPP

vodafone

METIS

ERICSSON

VIP (Vertical Industry Platform)

Industry 4.0 Open Labs

5G Open Platforms

Open Platform for Industry Cooperation & Innovation

5G: Convergence of Telecom & Vertical Industries

IoV, Smart Grid, e-Health, Smart Metering, …

VW · Fraunhofer · SIEMENS · BMW
BOSCH · SAP

IoT/ Vertical Industry

5G timeline

ITU's visions on 5G (IMT-2020)

Source: Document 5D/TEMP/625-E, ITU 22nd Meeting of Working Party 5D, San Diego, USA, 10-18 June 2015

WWRF (Wireless World Research Forum)

WIRELESS WORLD
RESEARCH FORUM®

- **Develop future vision of the wireless world**
- **Enable and facilitate the translation of the vision into reality**
- **Bring a wide range of parties together to identify and overcome significant roadblocks to the vision**
- **Inform and educate on trends and developments**

- **Global operation**
- **Covers every technical field of wireless communications and mobile networking**
- **Open to all**
- **Based on membership**

70 member organizations

Legend (left chart):
- Manufacturer
- Network operator
- Industry organization
- Academic institute
- Research organization

Legend (right chart):
- Africa
- Americas
- Asia
- Europe

Purpose of the group

- Within WWRF, a need identified to coordinate 5G standards with the requirements for communications in the automotive industries

- Approved setting up of a VIP

- Scope: WG to address:
  - The requirements of the automotive and transport industries on 5G technology
  - Identify use cases for 5G in these industries

Why WWRF for VIP?

WIRELESS WORLD
RESEARCH FORUM®

- WWRF is a *mature* international organization
  - ➢ Full-fledged charters and bylaws
  - ➢ Diversified members from both industry and academia
  - ➢ … …
  - ➢ In a nutshell, *a platform with very good infrastructure !*

- WWRF's targets
  - ➢ where new ideas / concepts are announced to the world
  - ➢ where industry meets academia
  - ➢ where telecom industry meets vertical industry
  - ➢ where CT (communication tech) meets IT (information tech)

- On the *5G pre-standardization platform (WWRF VIP)*
  - ➢ The telecom and vertical industries need to sit down to talk
  - ➢ New scenarios, use cases, requirements and technologies need to be discussed
  - ➢ Consensus needs to be built
  - ➢ …
  - ➢ Necessary preparation needs to be done before going to SDOs like 3GPP

VIP WG on Connected Vehicles

WIRELESS WORLD RESEARCH FORUM®

❖ Announced at WWRF #35 meeting in Copenhagen, Denmark, Oct. 15th

❖ Launch meeting in London, UK (11th January 2016)

❖ Scope & objectives

   ➢ Develop use cases and technical requirements for 5G supports of the connected cars and associated infrastructure

   ➢ Work with the global automotive industry to highlight and develop opportunities enabled by 5G

   ➢ Provide input to standardization process (3GPP primarily, also ITU, ETSI)

❖ Next steps planned

   ➢ Delivery of draft white paper to WWRF #36 meeting in Beijing, China (May 2016)

   ➢ Deliver contributions to 3GPP and ITU from March 2016

   ➢ Approval of final white paper at WWRF #37 meeting in Kassel, Germany (Sept 2016)

VIP-WG will bridge automotive and telecom industries

Connected Vehicle VIP

- LTE-V2X is for the BSA stage and the requirements are almost clear (to be checked by WWRF CV VIP).

  - After a long investigation by communication engineers , 3GPP has collected use cases and produced requirements and a traffic model for LTE-V2X in TR 22.885 (to be in TS 22.278).

  - No more work for CV VIP towards LTE-V2X if all requirements are checked and clear; leave the communication design work to 3GPP.

  - If WWRF VIP think there are some requirement not correct, liaison will be triggered to align requirements

- 5G-V2X is for ESA stage and 3GPP has also started the work.

  - WWRF CV VIP will mainly work on it and produce requirements and traffic model and then push to 3GPP afterwards to accelerate the whole procedure

WWRF major events in 2016

WIRELESS WORLD
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5G Huddle 2016
April, 2016
London, UK

WWRF #36 Meeting
May, 2016
Beijing, China

WWRF #37 Meeting
September, 2016
Kassel, Germany