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5G evolucija (ustvari revolucija) našeg života iz ugla autonomnog transporta

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E-Mobility Forum 2018

Prestali smo da svet gledamo svojim očima !!! 



photo by @Kalala

E-Mobility Forum 2018

Evolucija javnih mobilnih mreža

(gde idemo i kada ...)



What will be the system implications of supporting **machine communications** in 5G?

Communication for humans

Communication for humans and machines

E-mail
Photos

Video



Ultrafast, Ultra High Capacity
Massive connectivity
Ultra Reliable,
Low Latency

5G

Large volume
Data

4G

Voice and
Data

3G

Digital
Voice, SMS

2G

Analog
Voice

1G

New Paradigm

1980's

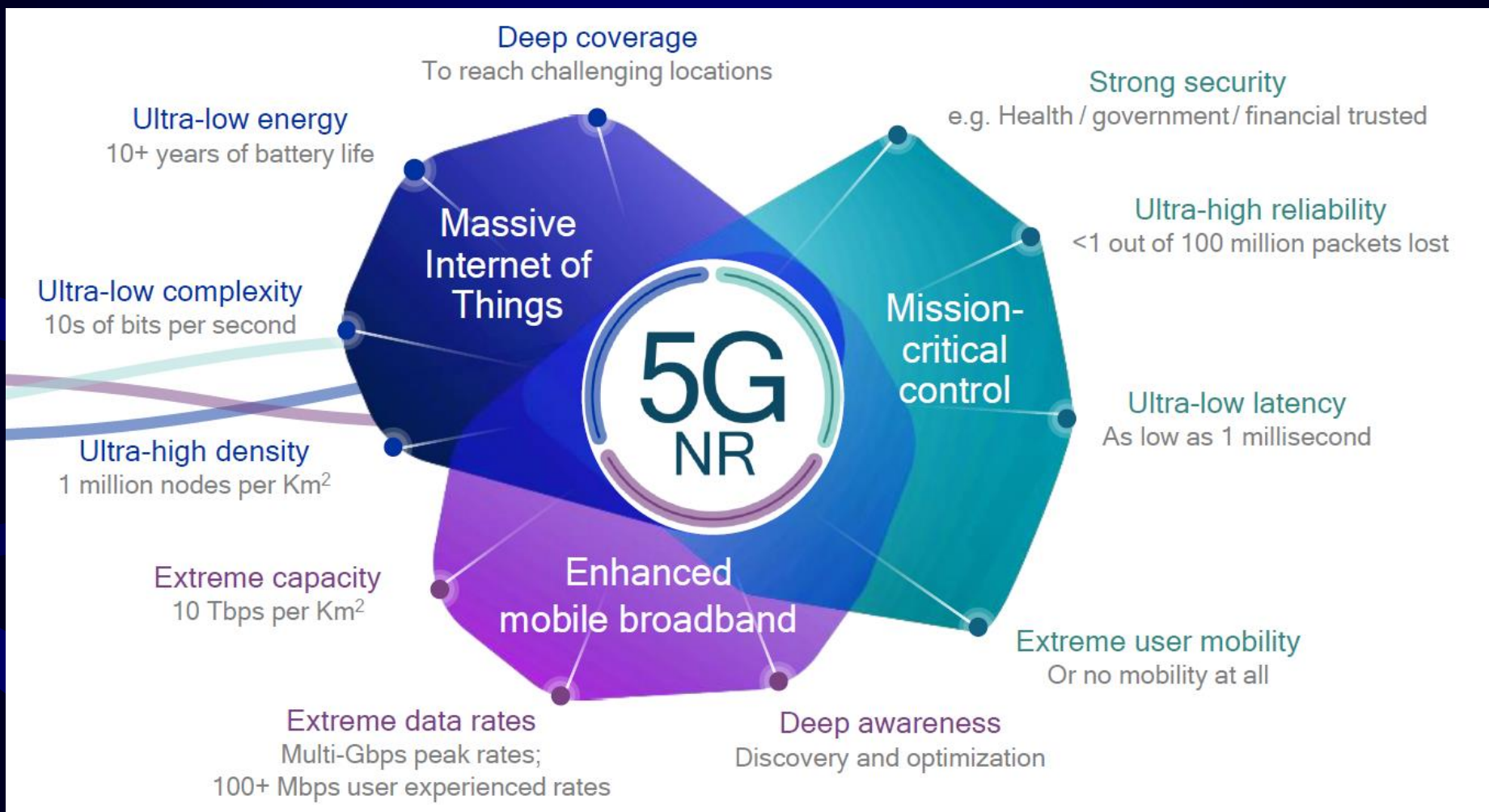
1990's

2000's

2010's

2020's

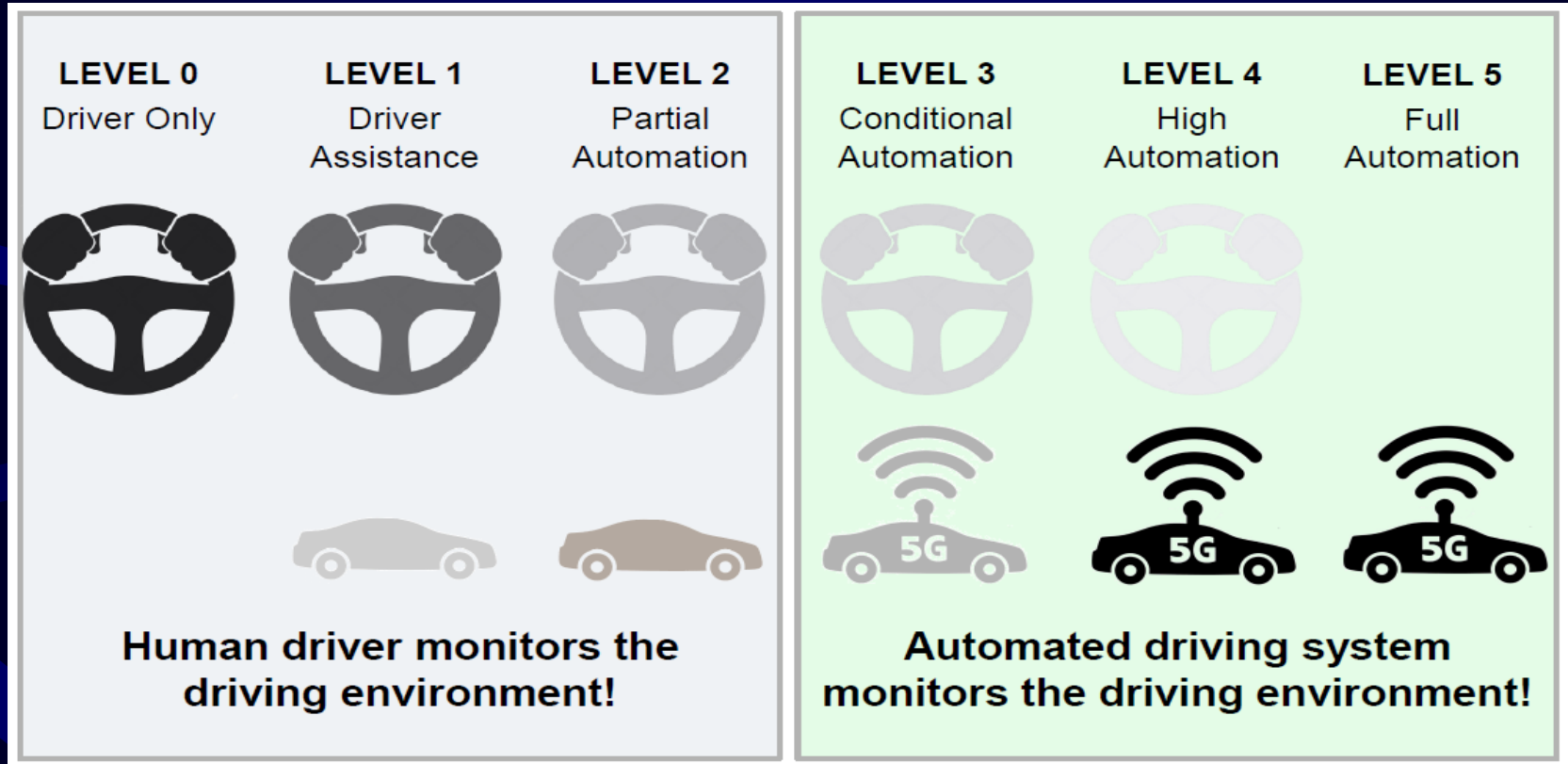
5G osnovni pravci razvoja



source: Qualcomm



Postupni prelazak na potpuno automatizovana vozila



Autonomna vozila



Vodafone
5G Mobility Lab

ALDENHOVEN
testing center

Stage
2
Oval Circuit
See-Through-Truck

LTE-V2X

Pedestrian Collision Warning

LTE-V2X

Stage
1

Smart Intersection

Assisted Intersection

Pre-emption
Switching for
Emergency Vehicles

Stage
4
Hill Section

LTE-BROADCAST

NB-IoT

Stage
5
Parking Space
Smart Parking

Stage
3
Braking Test Track

GEOMESSAGING

Predictive Safety
Warning

Safety Warning at the End of
Congestion or at the Hilltop

source: vodafone, germany

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Autonomna vozila (tipovi komunikacija)



Vehicle-to-Pedestrian (V2P)



e.g. pedestrian in
walkway ahead

Vehicle-to-Network (V2N)



e.g. traffic queue five
kilometers ahead

Vehicle-to-Vehicle (V2V)



e.g. emergency
vehicle approaching



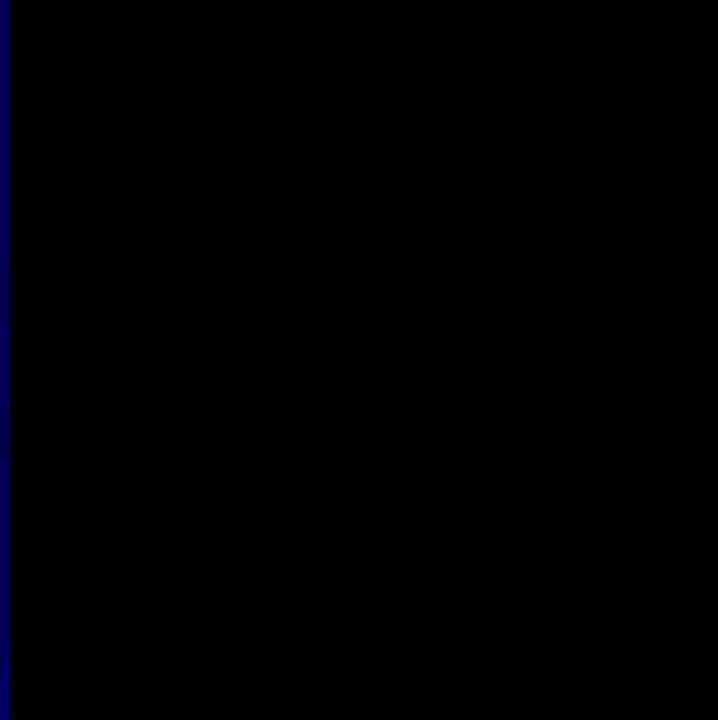
Vehicle-to-Infrastructure (V2I)



e.g. traffic signal ahead
turning red

source: [Qualcomm](https://www.qualcomm.com)

Raskrnica budućnosti (simulacija)



***E-Mobility
Forum 2018***

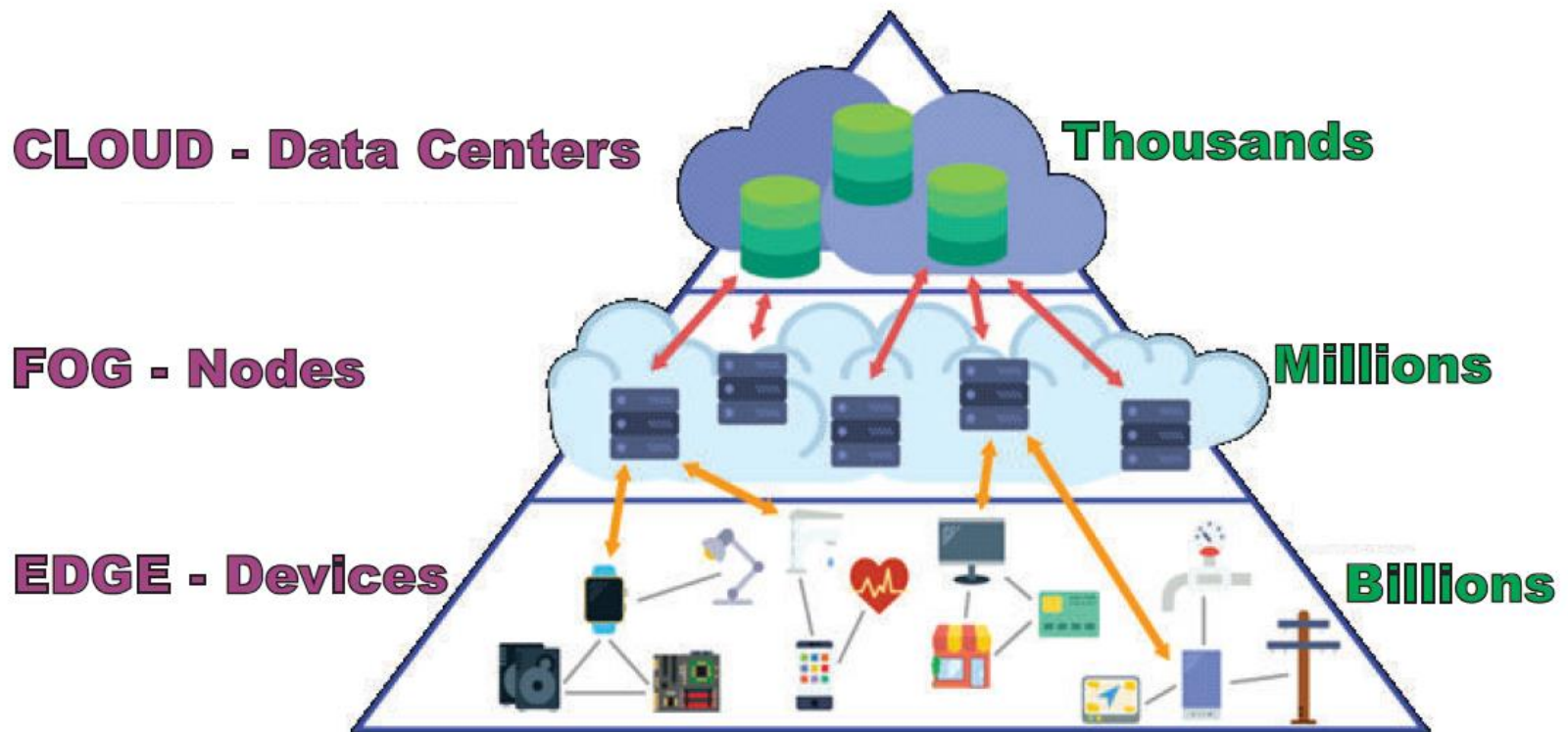
Raskrpnica budućnosti (filmska montaža)



Reorganizacija mobilnih mreža

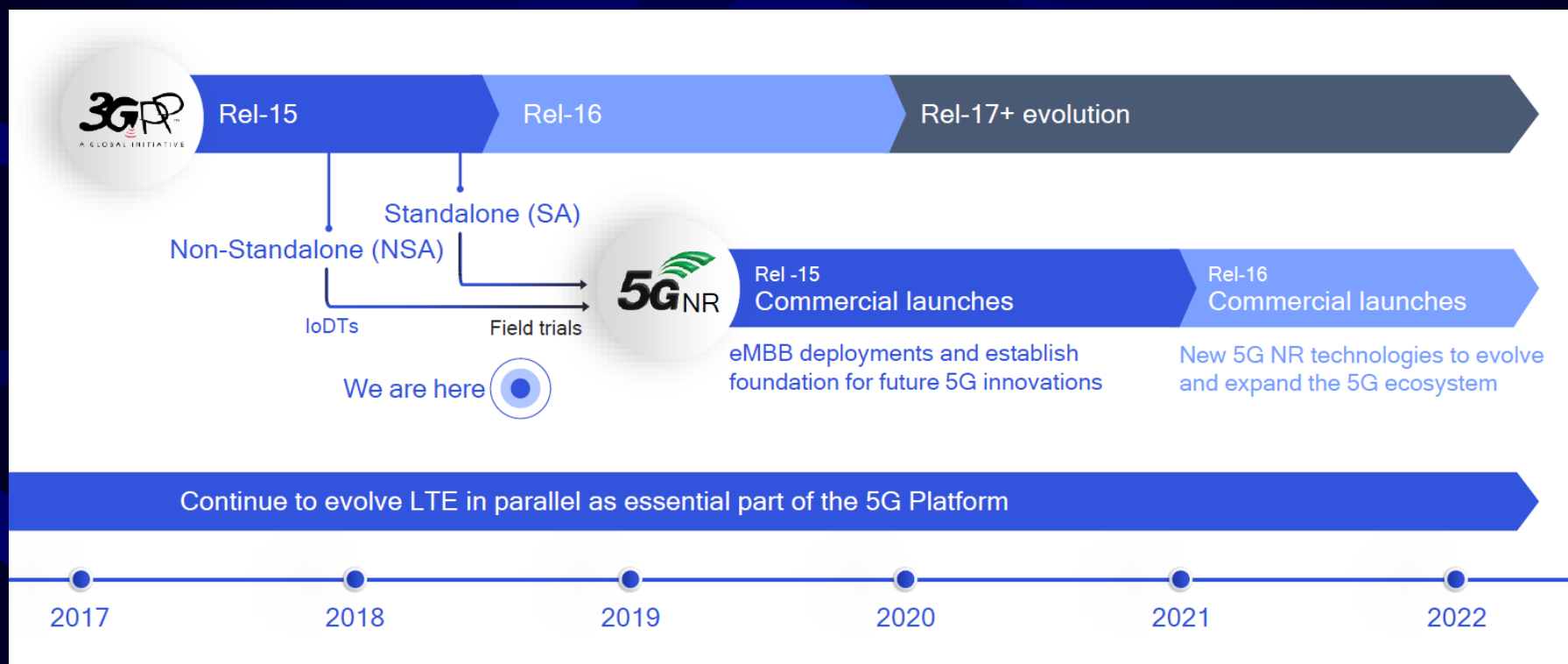


- SDR (*Software Defined Radio*)
- SDN (*Software Defined Network*)
- NFV (*Network Function Virtualisation*)
- *Network Slicing*
- *Network orchestration*
- *FOG paradigm*



3GPP Release 15 – uvođenje novog radija (NR)

- vremenska dinamika ugovorena u martu 2017.
- prvi sastanci u oktobru 2017.
- interesantno: već su realizovani prvi 5G pozivi !!!



Source: Qualcomm

- prve potpuno komercijalne mreže očekuju se početkom 2020.god

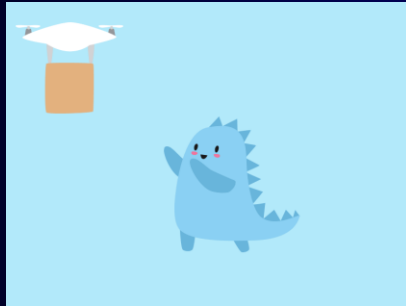
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Prvi koraci ka 5G



- Definisanje novog frekvencijskog spektra (globalno i lokalno).
- Prodaja frekvencijskog spektra – Srbija 2020 !
- Operatori za pojedine nove servise ne moraju striktno biti postojeći mobilni operatori (npr. za transportne sisteme).
- Definisanje striktne tehničke i pravne regulative (naročito za kritične servise koji podrazumevaju opštu fizičku bezbednost ljudi).
- Prilika za mobilne operatore reorganizuju svoje poslovanje.

Pametni 5G svet



- smart energy networks
- smart city
- smart drone delivery
- smart agriculture
- smart manufacturing
- smart retail
- smart glasses
- smart
- ...



- IoT (Internet Of Things)
- IoE (Internet Of Everything)

*Nove mreže treba da reaguju brže od treptaja oka,
ali i da budu pouzdanije od njega*



*U novim mrežama naš život će biti u rukama
telekomunikacionih mreža i sistema
(i to u bukvalnom smislu !!!)*