LIDS'80 Session on Information Theory, Communications, and Networks: Achievements and Challenges

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The Past: Information Theory and Coding

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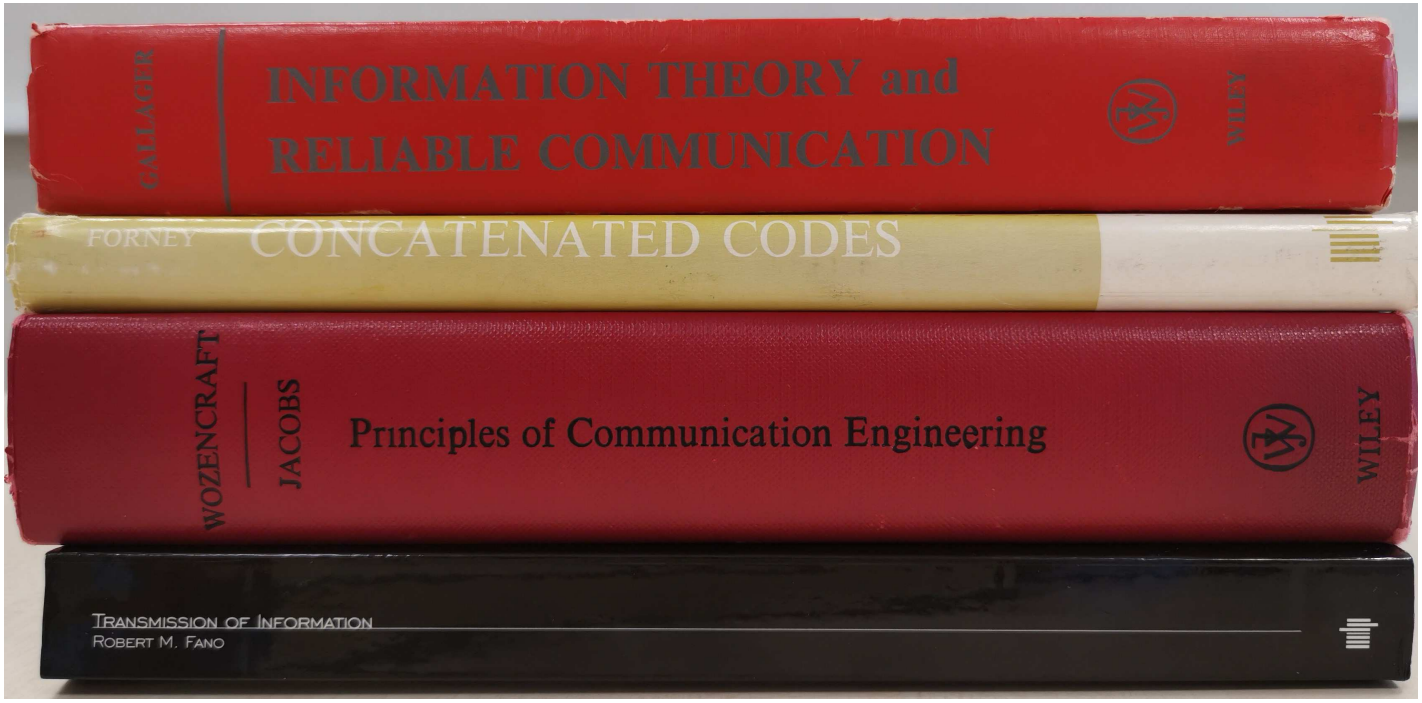
- Classics of the field ...



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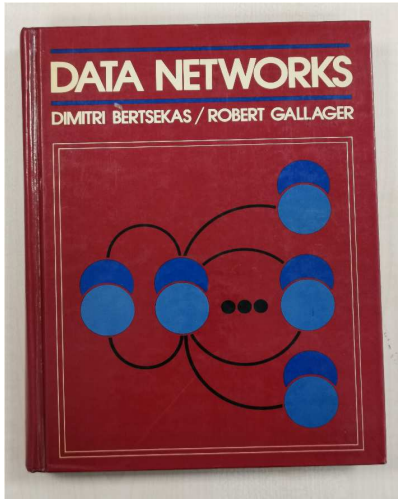

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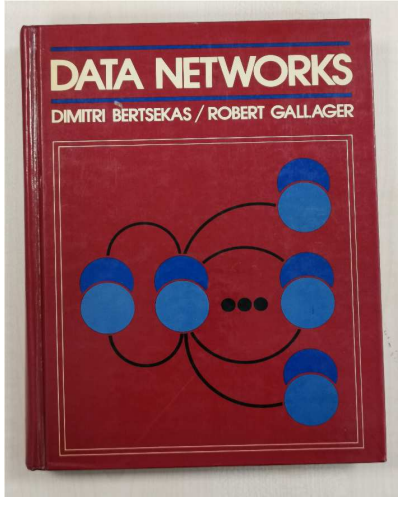

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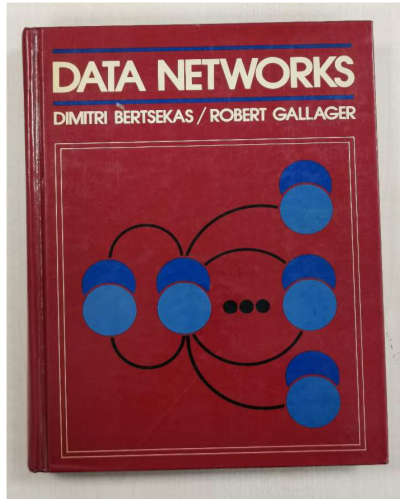

- All-optical networking
- Wireless communications, MIMO communications

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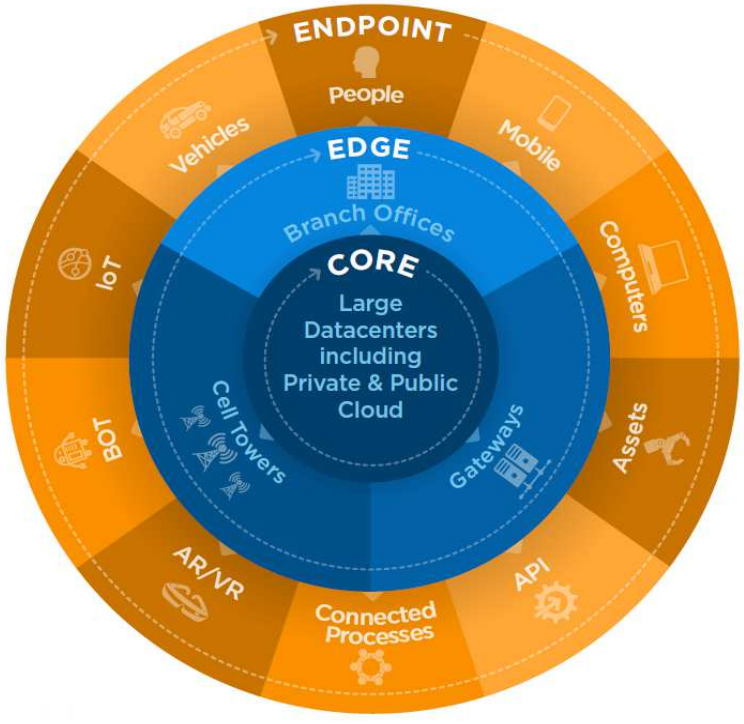
- A prime case in point is LDPC codes – the work-horse of WiFi and 5G – which was an idea some three decades ahead of its time

The present landscape

The challenges in communications can be understood in terms of a datasphere that consists of:

- endpoints, where data is generated and used,



Source: IDC's Data Age 2025 study, sponsored by Seagate

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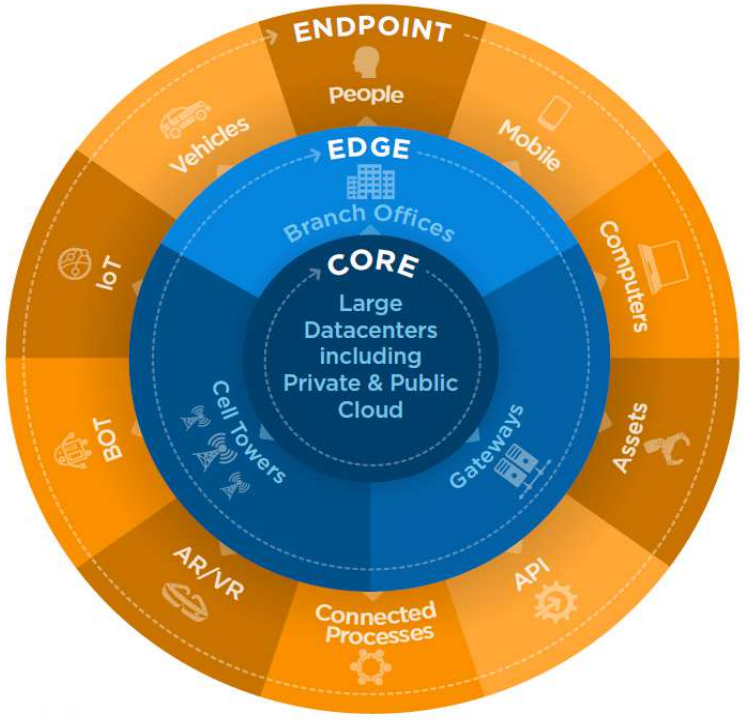

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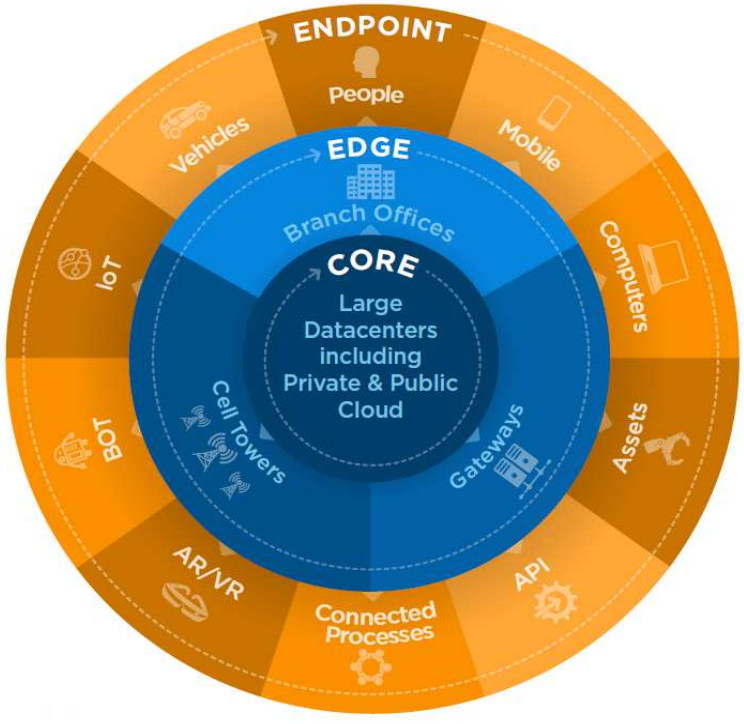
- endpoints, where data is generated and used,
- core, where data is moved around, stored, and processed,
- edge, where the endpoints and the core meet.



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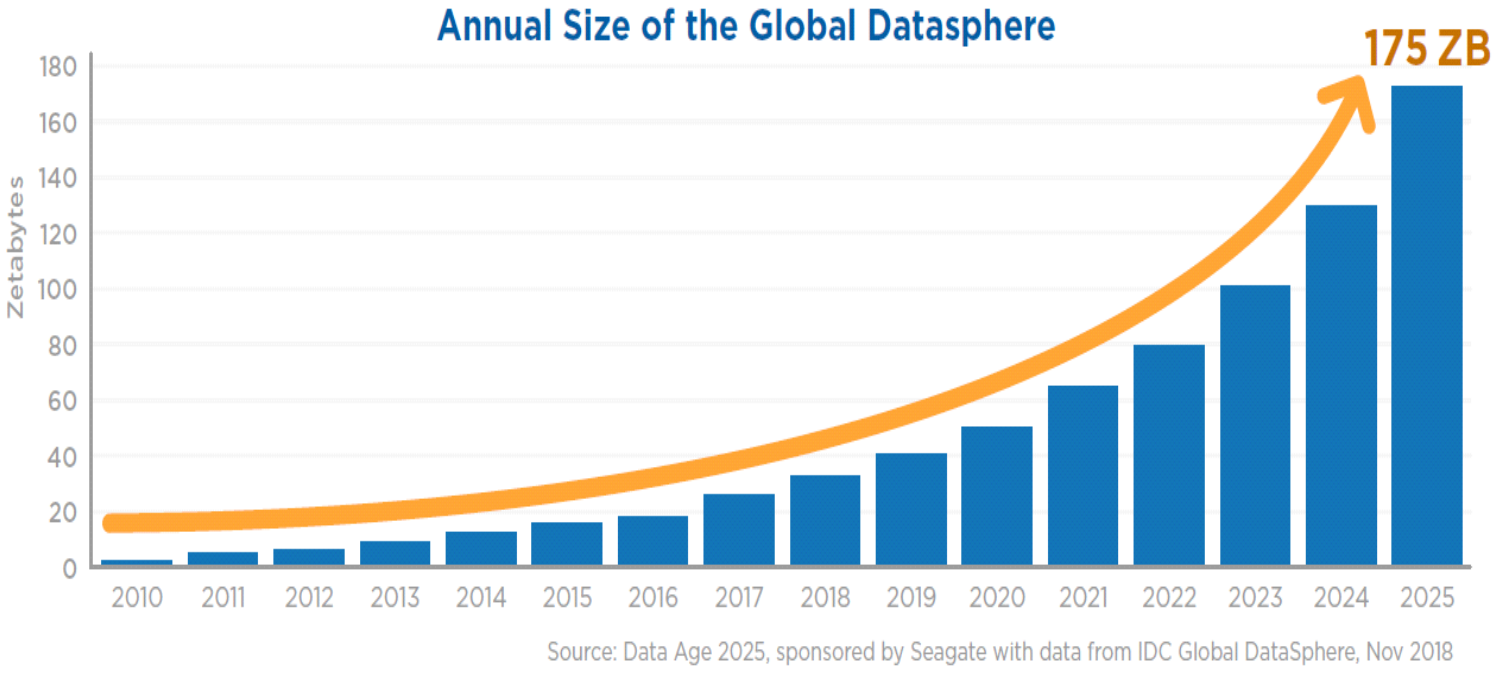
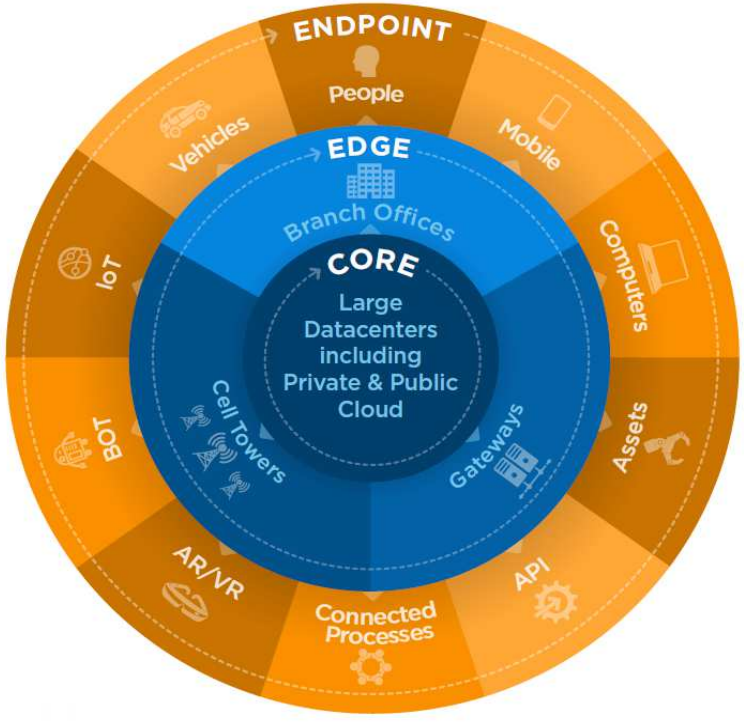
Data growth


Annual Size of the Global Datasphere
175 ZB
Zetabytes
180
160
140
120
100
80
60
40
20
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Source: Data Age 2025, sponsored by Seagate with data from IDC Global DataSphere, Nov 2018

Challenges

- Bandwidth problem



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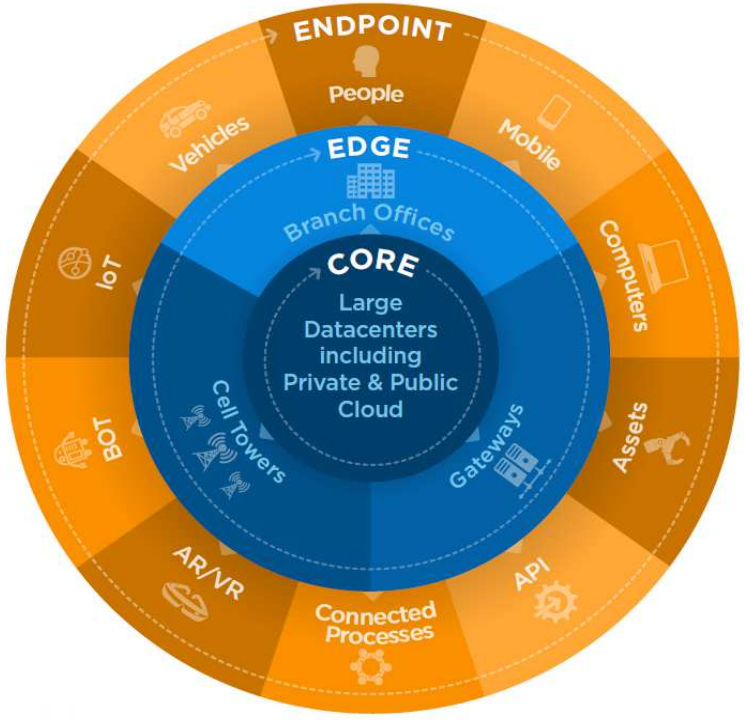

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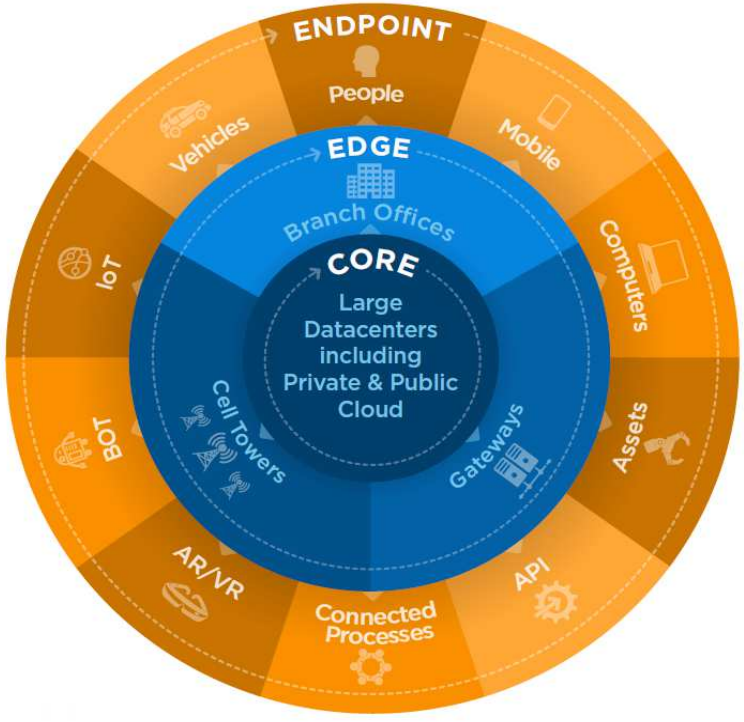

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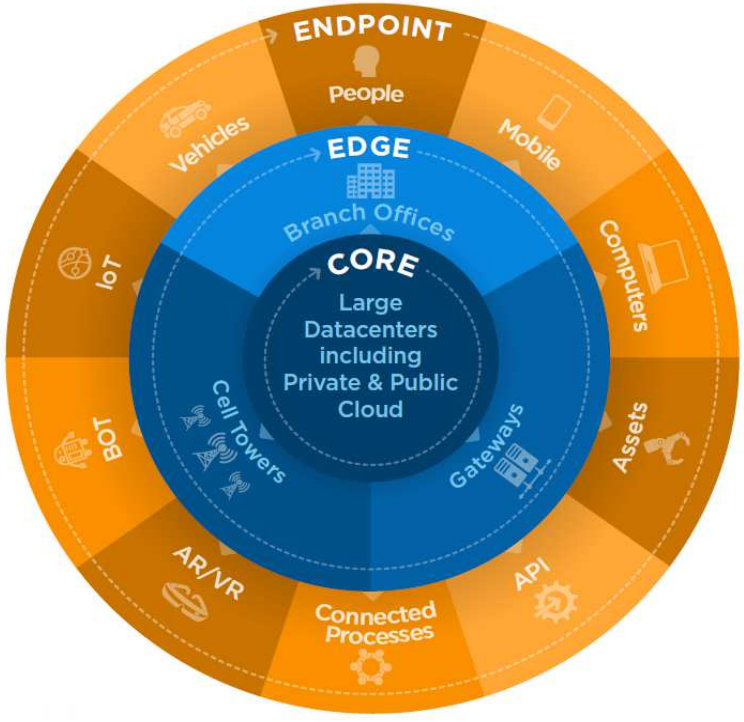

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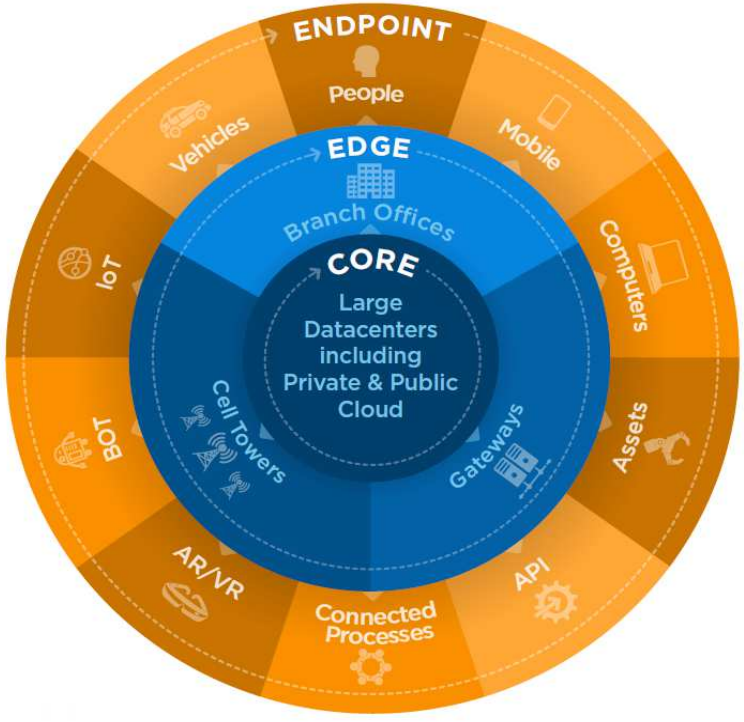

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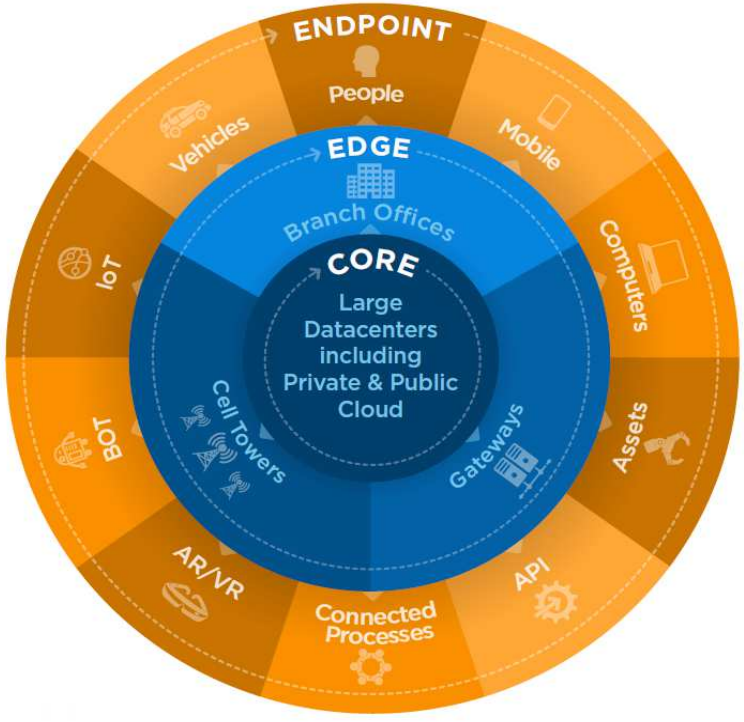
- Data processing challenges



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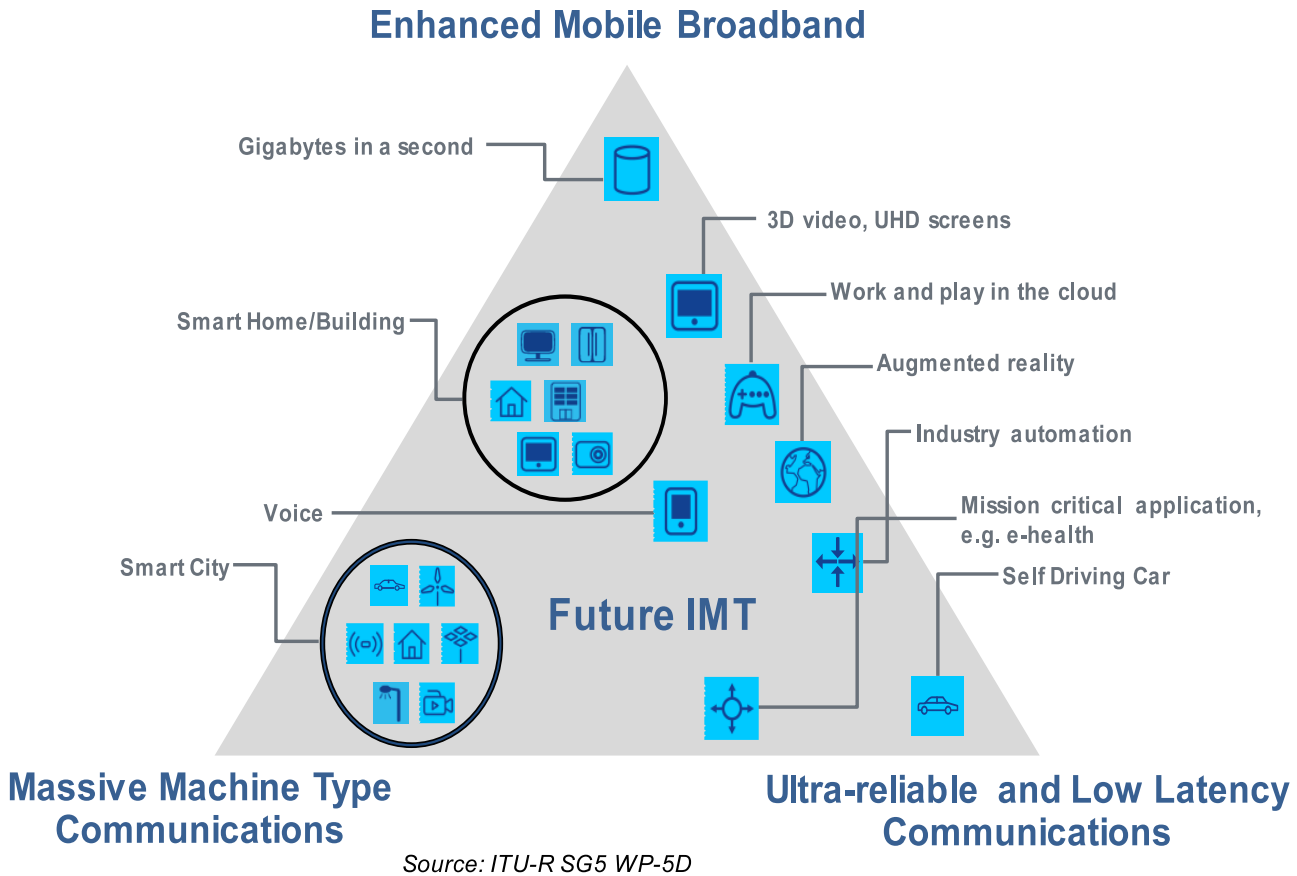
5G vision



Source: ITU-R SG5 WP-5D

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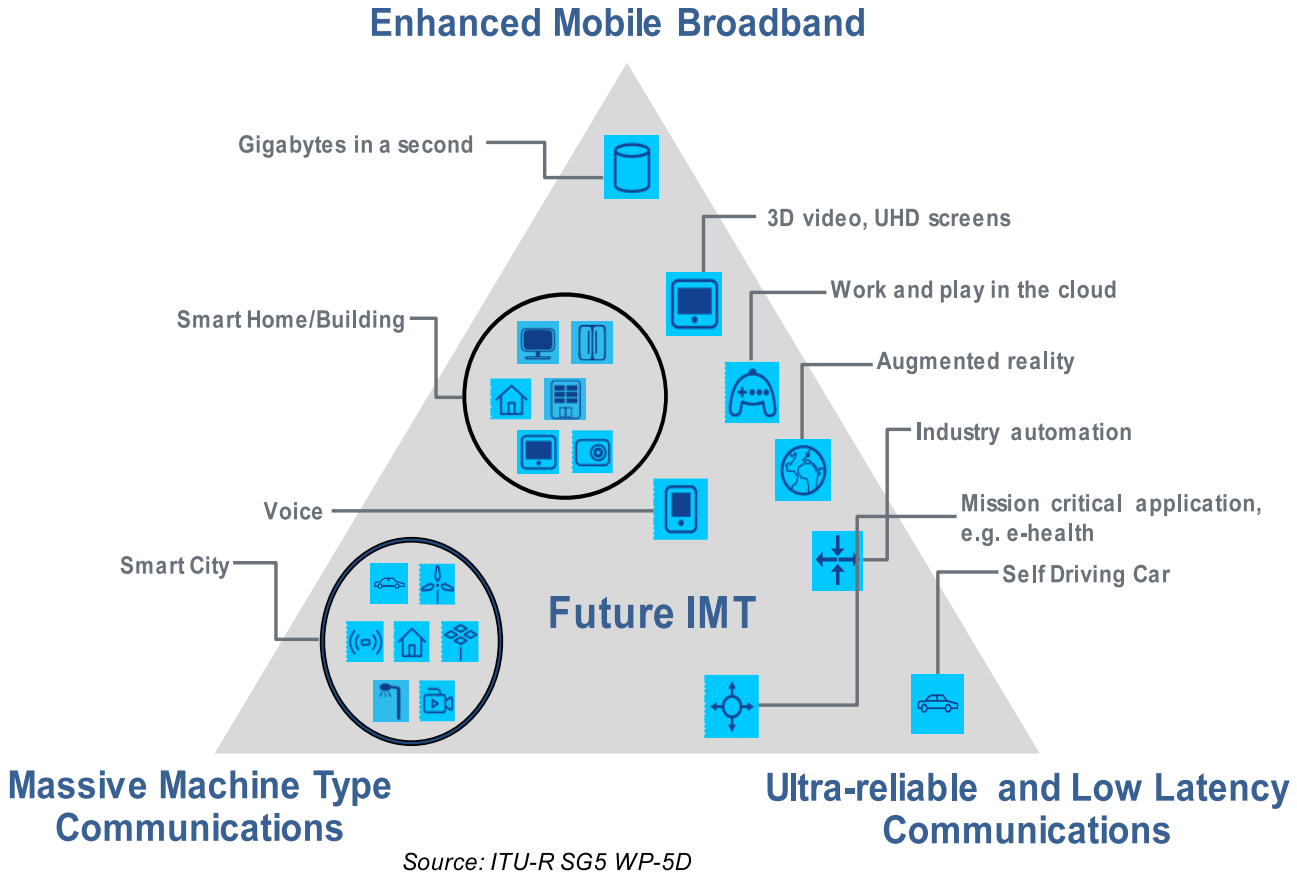

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- 5G envisages a proliferation of communication services
- Can a single standard cover such a diversity of services?

Forecast

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- Routine product-cycle fixes will not meet the growing demand for data communications as VLSI technology stalls
- Information theory will continue to play a key role in building ever more sophisticated communication systems
- LIDS-style pioneering research on communications and networking will continue to be relevant for decades to come

Happy 80th Anniversary!!!