



5G mobile Networks Development

Technical and regulatory emerging issues

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Agenda

- 1 Introduction
- 2 5G: technological enablers
- 3 Regulatory requirements
- 4 Conclusion

Introduction (1/2)



5G, three basic use cases...



eMBB: Enhanced network coordination and management functions, mobility management, virtualisation, etc.



Massive MTC: Service availability, Low power, Low costs, privacy, security, ect.

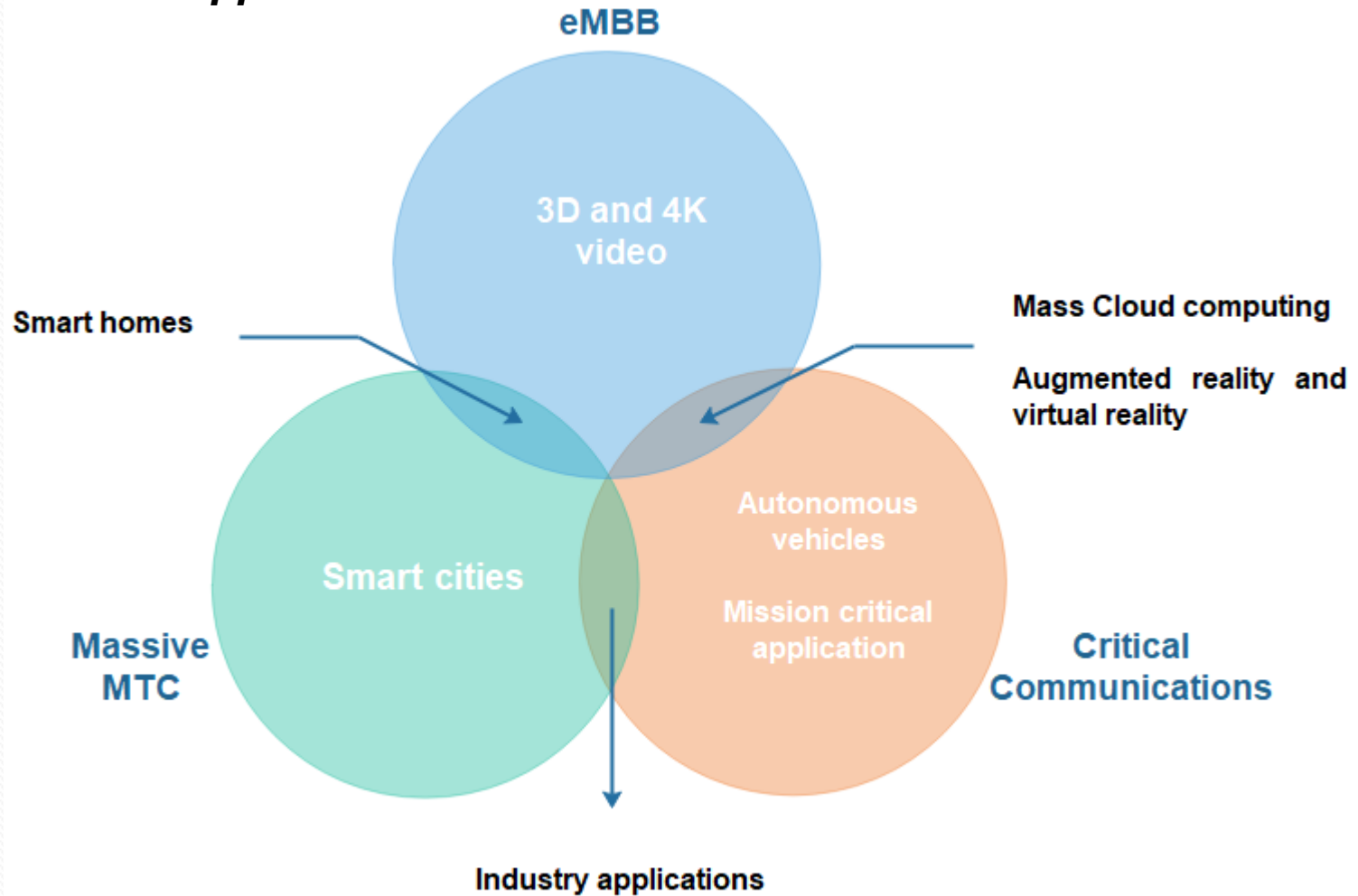


Critical Communications: Ultra low latency, High reliability, enhanced user experience, etc.

Introduction (2/2)



5G, services and applications





Technological enablers (1/4)

Technical developments

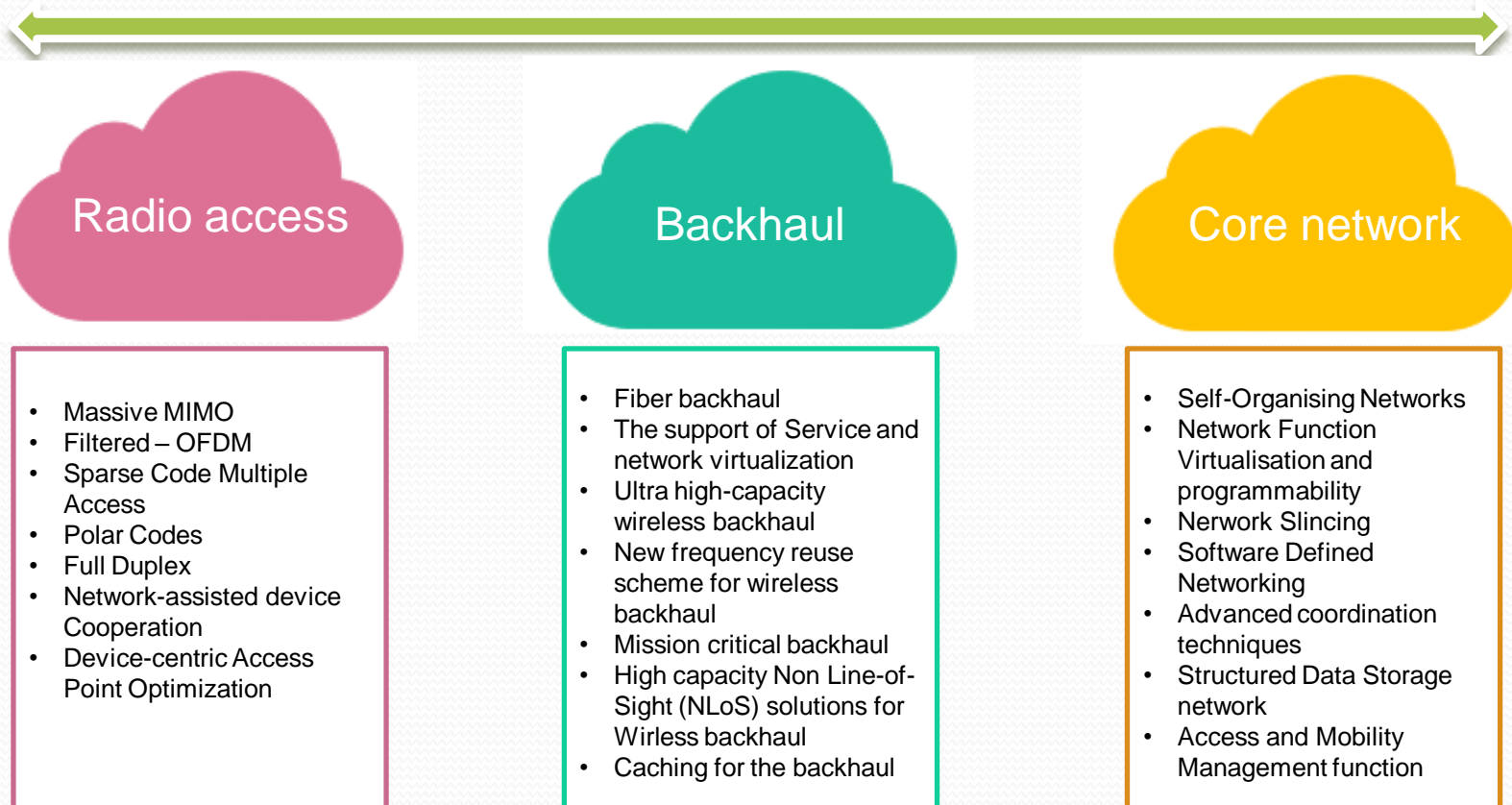
- Massive MIMO
- Enhanced RAN capabilities
- Shared spectrum access
- Advanced Inter-node coordination
- Simultaneous Transmission Reception
- Multi RAT Integration & management
- New waveforms
- Contexte aware networking
- Flexible networks
- Moving networks
- Information centric networks
- Enhanced backhauling capabilities
- Efficient small data transmission



Technological enablers (2/4)

Network infrastructure and topology

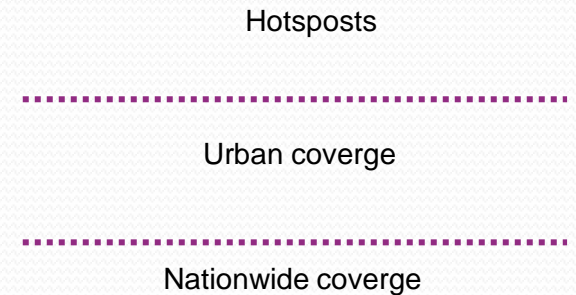
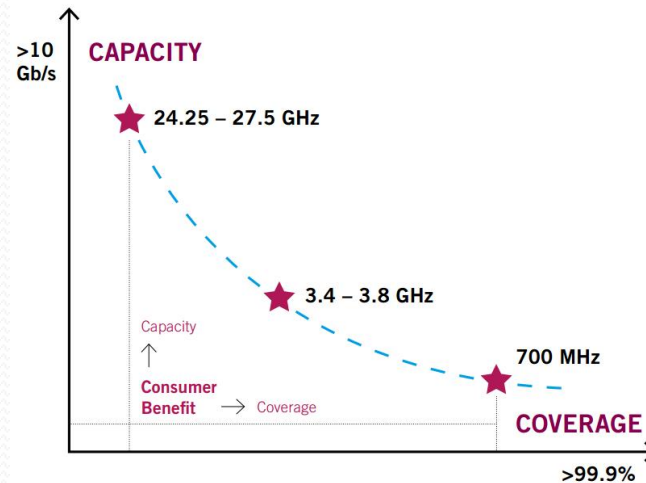
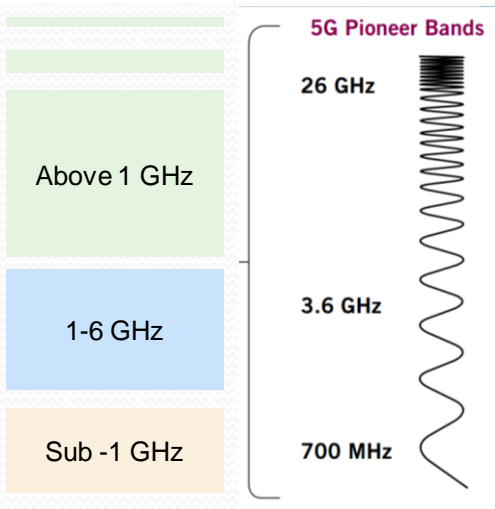
Flexible, customizable, scalable and context aware networks





Technological enablers (4/4)

Spectrum



Main recommendations for governments and regulators

1

Making spectrum available in a timely manner

3

Consider technological neutrality in spectrum licences

2

Engaging in international spectrum harmonisation activities

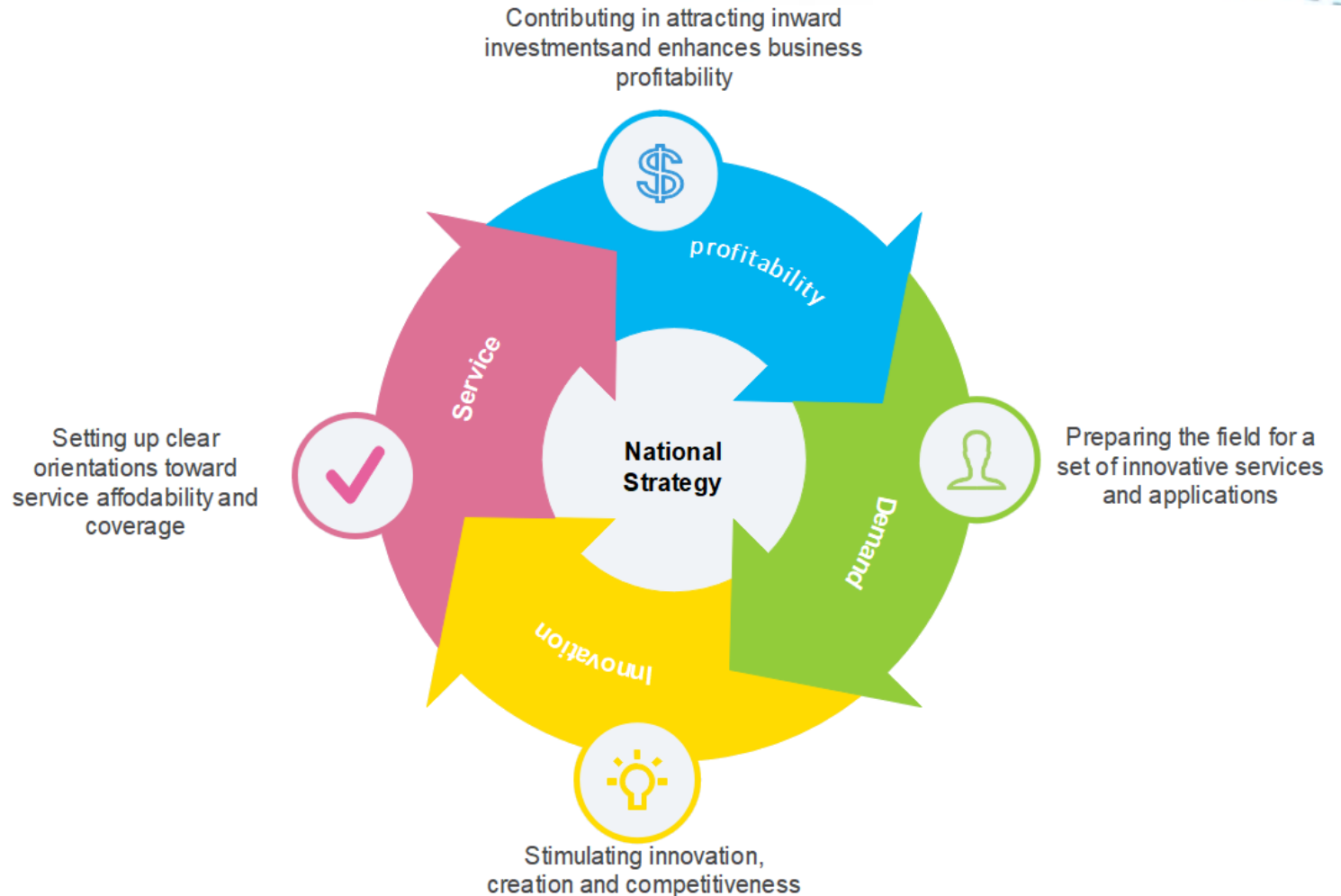
4

Adopt national policy measures to encourage investments in 5G



The need for national strategies

Why do we need a 5G national strategy ?

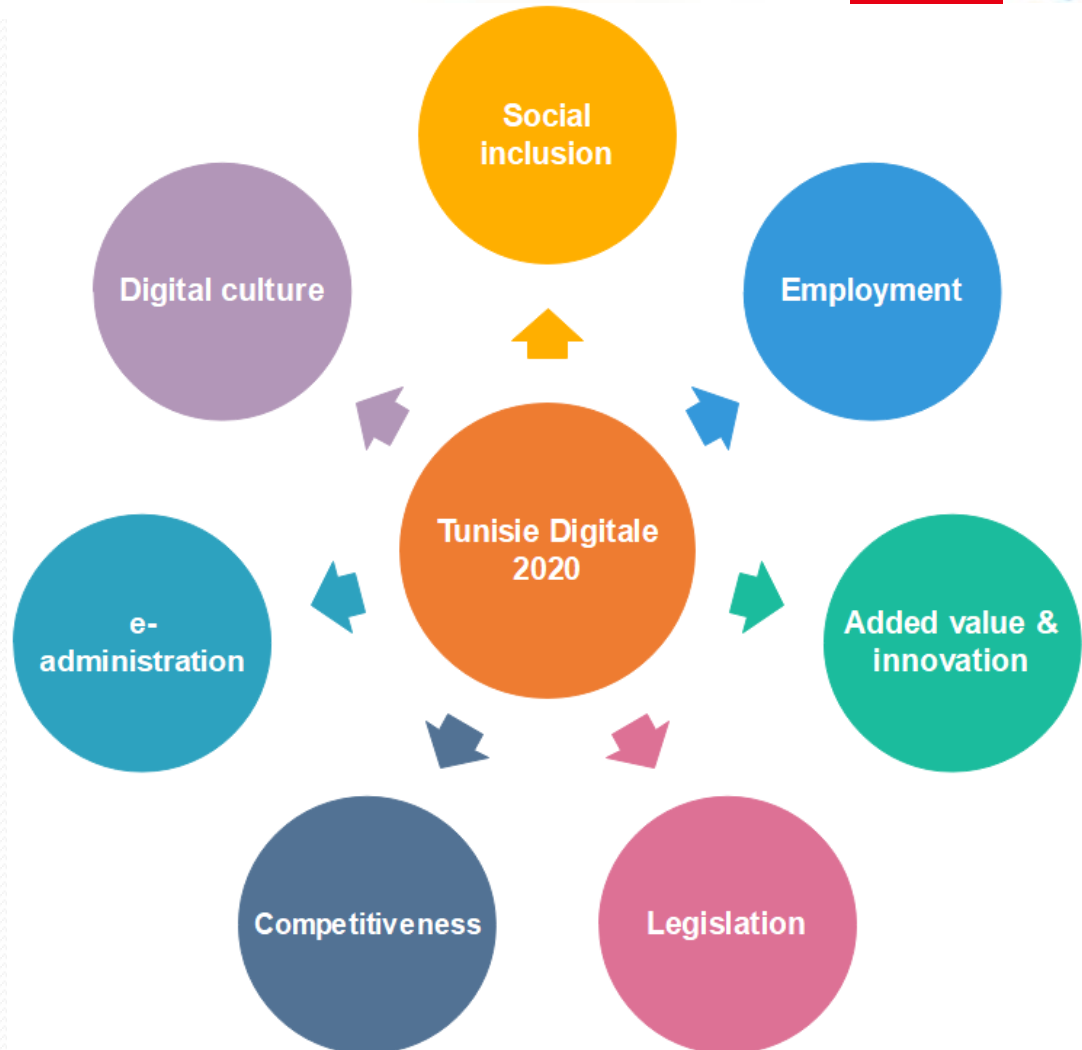


Tunisian National Digital Strategy (1/3)



**National strategic plan
« Tunisie Digitale 2020 »...**

Strategic orientations ...

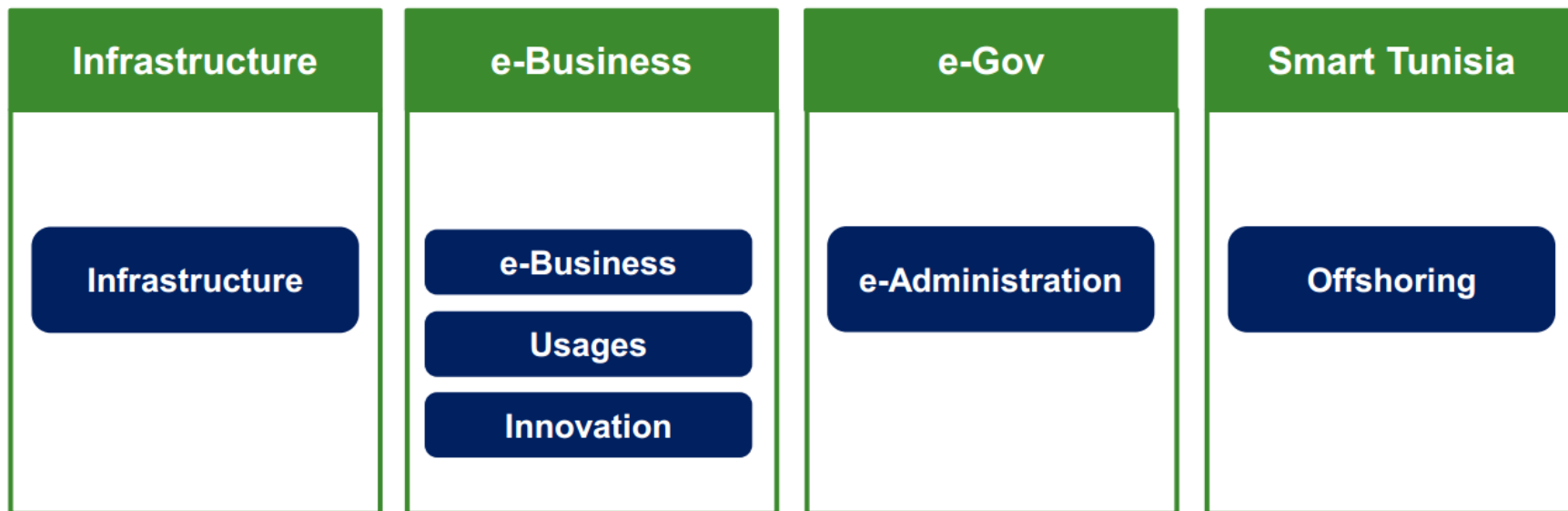


Tunisian National Digital Strategy (2/3)



National strategic plan « *Tunisie Digitale 2020* »...

Four programs ...



Tunisian National Digital Strategy (3/3)



Tunisie Digitale 2020



Objectives related to BB and UFB

	2015	2020
Fixed broadband penetration	4,9%	10%
Mobile broadband penetration	30,9%	60%
Households having Internet access	18,2%	100%
People having Internet connection	43,8%	85%
International Bandwidth/user (kpbs)	19,1	25
UFB penetration	0,2%	6%

Main measures to achieve BB and UFB objectives

- Enhance infrastructure sharing mechanisms
- Establish a national infrastructure map with different connectivity scenarios including mobile (4G) or fixed (VDSL and FTTH) technologies or a mix between them
- Preconise detailed PPP models to generalise UFB and
- Develop innovative online content
- Subsidize handsets and subscription a certain social classes



Innovative regulatory framework

Innovative regulatory framework principles

01

Participatory/ Open to stakeholders' views



02

Proactive, which anticipates innovation



03

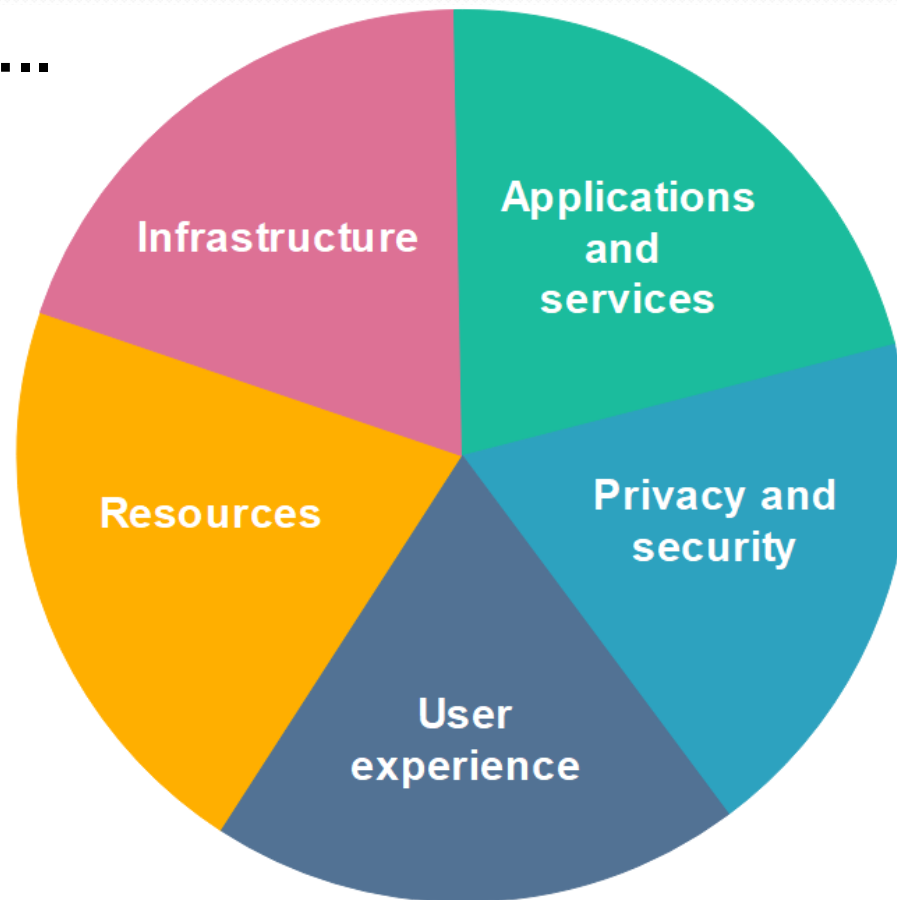
Encourages entrepreneurship and initiative



Regulatory requirements (1/6)



5 Pillars





Regulatory requirements (2/6)

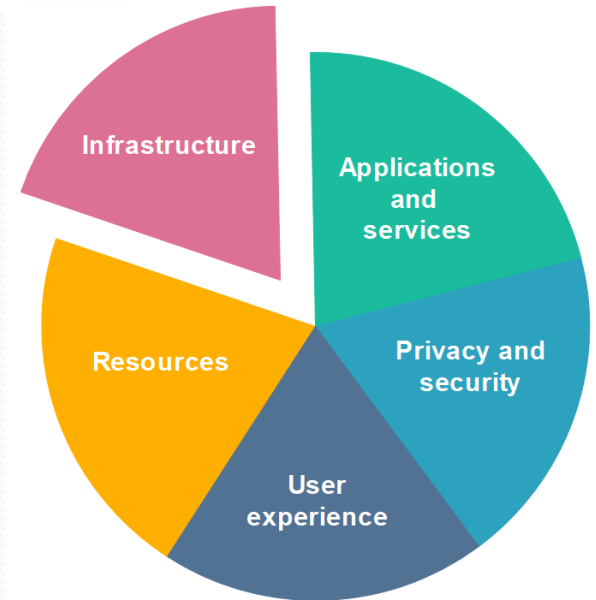
Infrastructure

Mobile:

- Focus on securing reliable universal coverage as well as high capacity urban coverage
- Encourage Radio Access Network (RAN) sharing

Fixed:

- Tackle passive Infrastructure access issue (ducts, poles etc.) to deliver the benefits of 5G to the largest number of consumers (include all public utility facility owners)
- Encourage Active Network Sharing for fiber backhaul





Regulatory requirements (3/6)

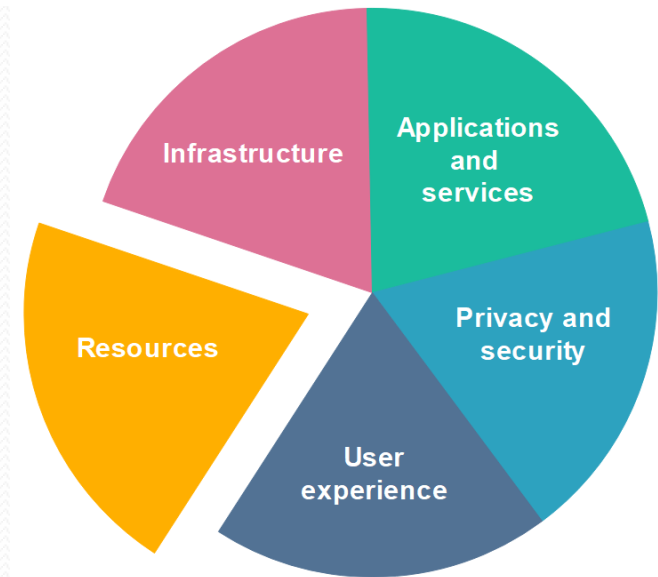
Resources

Frequencies:

- Ensure the availability of spectrum in a timely manner
- Ensuring mobile licences are technology and service neutral to encourage 5G upgrades

IPv6 addresses:

- Ensure the availability of addressing resources for the need of new services (IoT, M2M, etc.)
- Accelerate the adoption of the IPv6 through the elaboration of a national roadmap





Regulatory requirements (4/6)

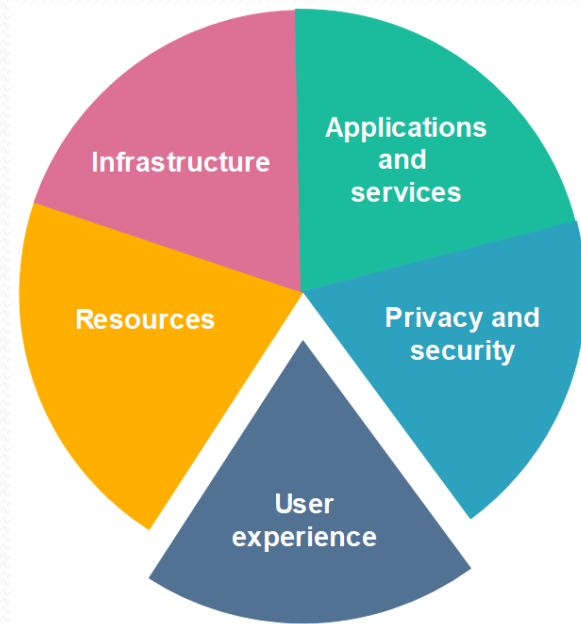
User Experience

Issues:

- Focus on the “*Quality of coverage*”

KPIs:

- Availability
- Bandwidth
- Cell-edge user throughput
- Connection density
- Control plane latency
- End-to-end latency
- Coverage area probability
- Energy efficiency
- Mobility
- Reliability
- Etc,





Regulatory requirements (5/6)

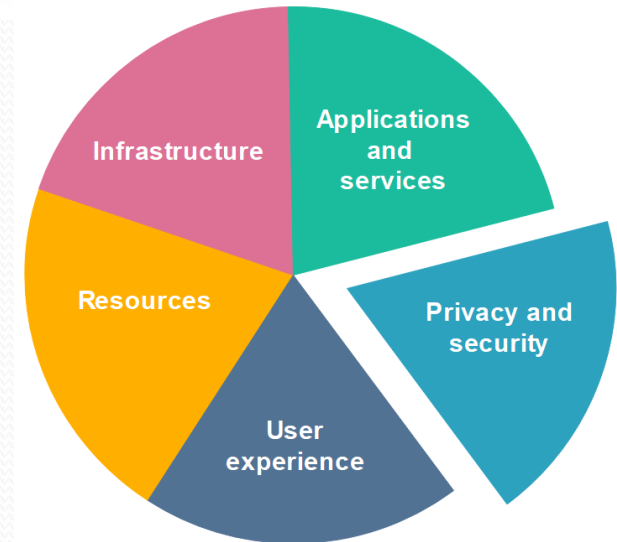
Security and privacy

Privacy:

- There is a need to adopt international standards regarding personal data protection
- This issue is particularly important with the IoT services

Security:

- Comprehensive security architecture is essential to take care of security challenges
- All stakeholders and research community need to work together to form a security ecosystem



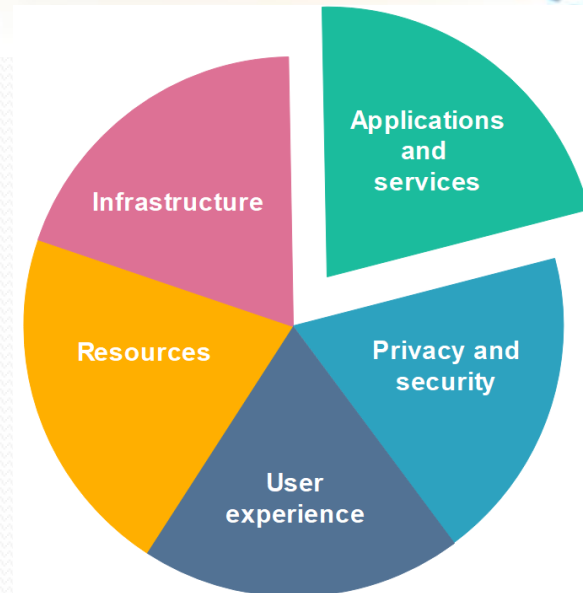


Regulatory requirements (6/6)

Applications and services

Applications and services :

- Enabling the IoT applications
- Encourage the development of content
- Promote net-neutrality





Projects of the INT (1/2)

- ❑ Public consultation on Fiber infrastructure sharing issued in september 2016 and available online (done)
- ❑ A study which proposes a national IPv6 roadmap (done)
- ❑ A draft decision establishing general ruled for fiber infrastructure sharing (ongoing)
- ❑ A study for the development of a model for the calculation of fiber infrastructure costs (ongoing)



Projects of the INT (2/2)

- ❑ A new telecommunication code with new infrastructure sharing rules (under the supervision of the ministry)
- ❑ Guidelines setting up strategic principles for the development of IoT services
- ❑ The achievement of the goals announced in national strategic plan « *Tunisie digitale 2020* » ...
- ❑ ...



Thank you for your attention

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