



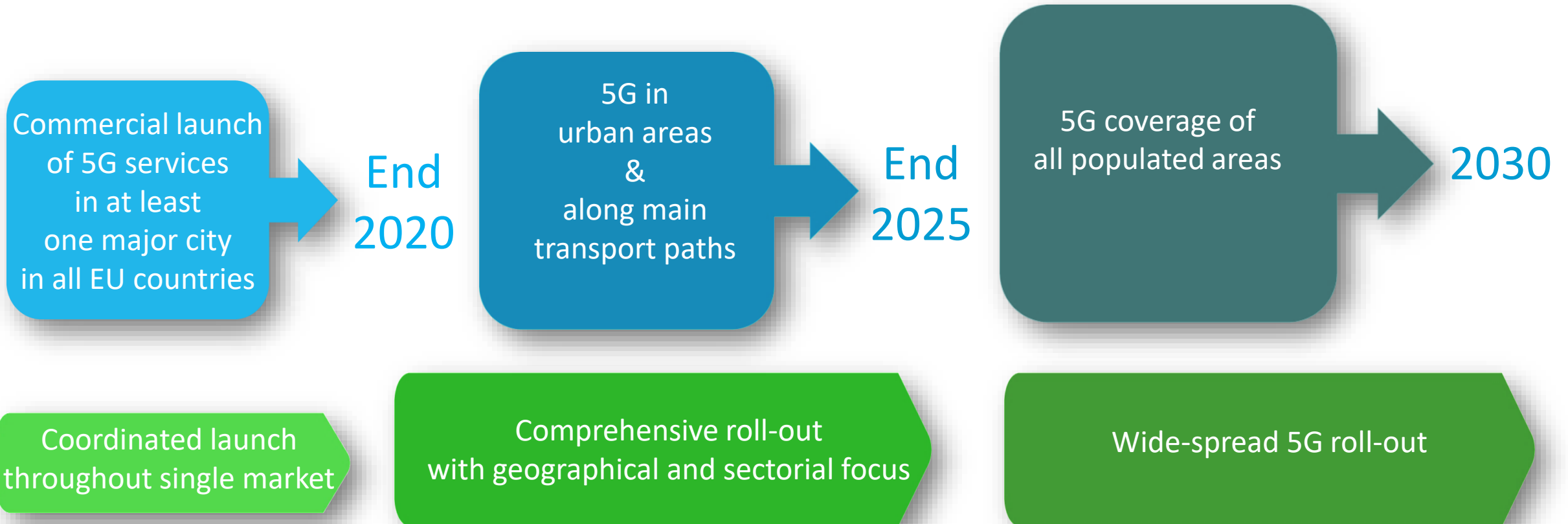
5G investment & 6G research for a resilient and competitive Europe

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5G targets in the digital decade

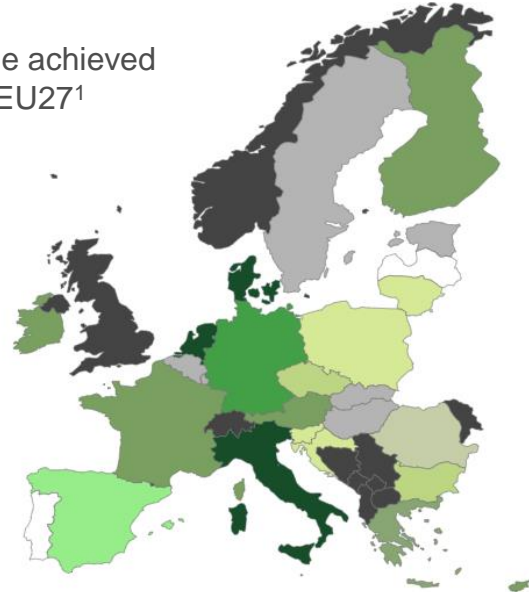


5G: European Status

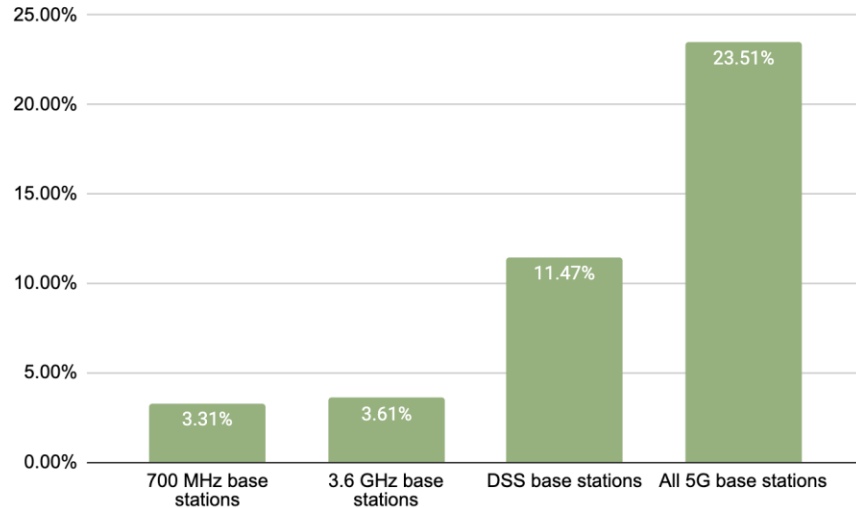
5G deployment & coverage

64% population coverage achieved by end of 2021 in EU27¹

Non-EU country
Darker green indicates higher coverage

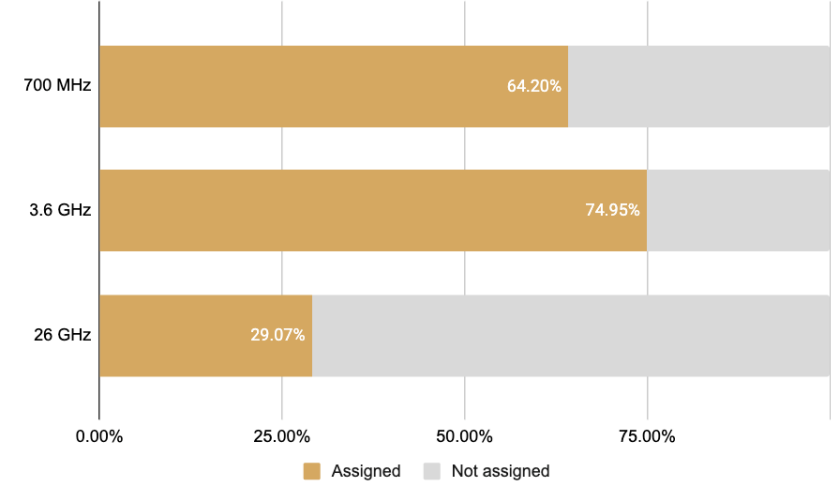


147,308 5G base stations total
5G base stations as a percentage of existing 4G base stations²



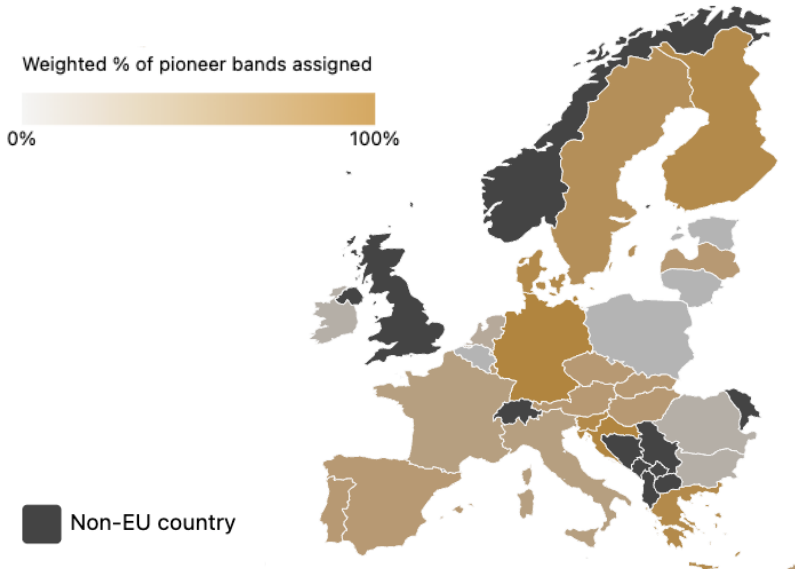
5G spectrum assignments

56% of pioneer bands assigned on average in EU27 (Each pioneer band is weighed 1/3rd)³



5G pioneer bands assigned across the EU27³






Weighted % of pioneer bands assigned
0% 100%



5G: International Status, Technology and coverage

Comparison of 5G rollout in international markets⁴

5G rollout

	China	South Korea	Japan	USA	EU
					
5G Mode	NSA/SA	NSA/SA	NSA/SA	NSA	NSA/SA
Approximate number of 5G base stations	916,000	162,000	50,000	50,000	147,308
Population	1,402,000,000	51,780,000	125,800,000	329,500,000	447,706,000
People per base station	1531	320	2516	6590	3039
Indicative 5G subscribers	460 million (source: Ericsson 2021)	17 million (source: 5G Forum, Korea)	14.19 million (source: Japan times)	80 million (including Canada; source: Ericsson 2021)	31 million (including all of western Europe; source: Ericsson 2021)

Next Generation EU - RRF

Key investments:

- **Fixed and 5G connectivity infrastructure (EUR 13bn)**
- Digitalisation of public admin/ services (EUR 43bn)
- Digitalisation of businesses, in particular SMEs (EUR 24bn)
- Digital skills (EUR 20bn)
- **R&I / deployment of advanced technologies (EUR 18bn)**
- Cybersecurity

20%



Key target

EUR 117bn (**26%** of total) to **digital** measures

Key reforms

- Modernising public admin/ services
- Removing barriers to 5G
- Mainstreaming digital skills

Multi-Country Projects

- **Microelectronics**
- **Cloud**
- **5G corridors**
- **VHC submarine cables**

Investing in 5G: Connecting Europe Facility and direct EU funding

Large-scale 5G deployments



Major transport paths



Urban areas

Local 5G systems



Rural areas

Facilitate and accelerate **5G deployment and take up** (bundling connectivity to applications)

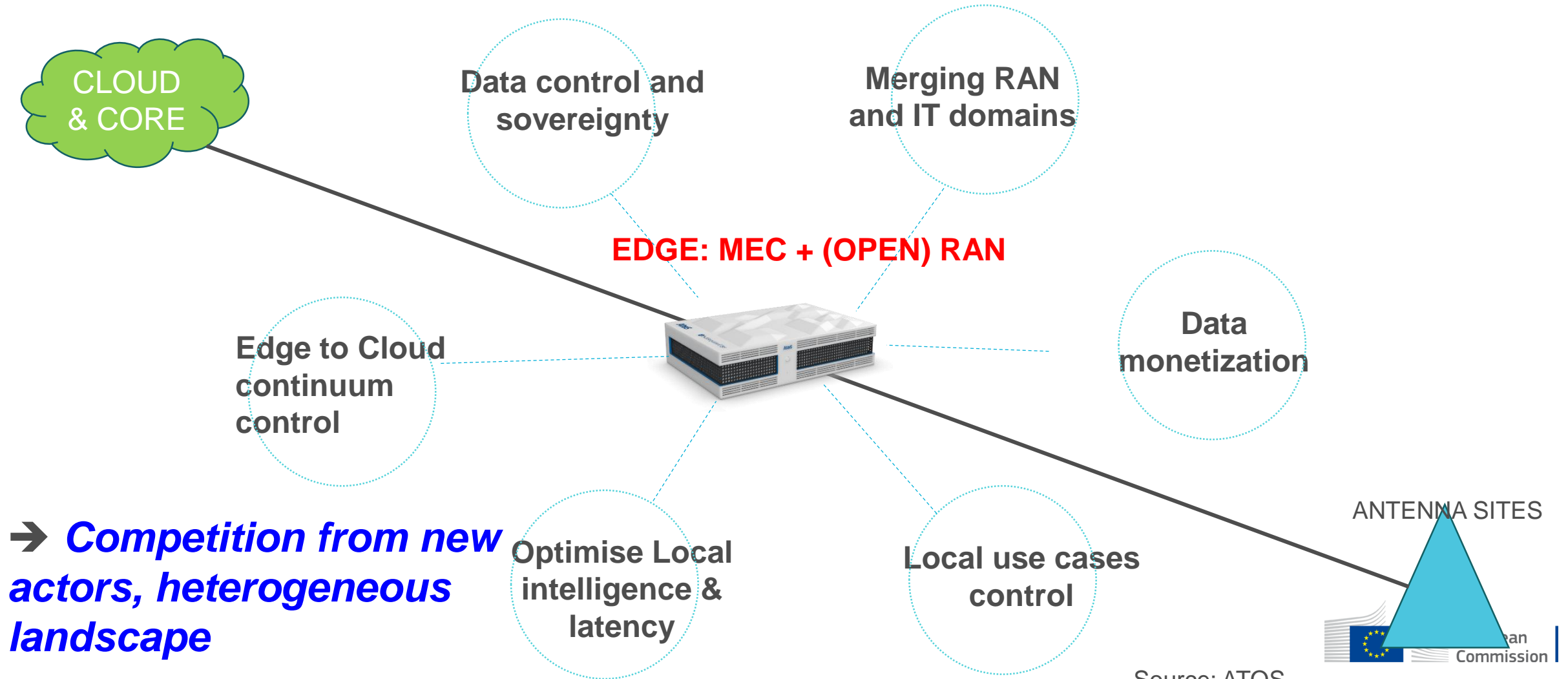
- 5G for smart communities: 89 m EUR
- vertical use cases for general interest services: e.g. hospitals/ universities
- diffuse best practises for replication

5G corridors: 1bn EUR, first batch (€ 100 million under evaluation)

- high-end 5G infrastructure for mobility services
- cross-border seamless roaming

Moving “Beyond 5G”

The rising role of edge computing and Telco- cloud, initiated with 5G.













Beyond 5G, 6G: Global Momentum


North America

-  NEXT G ALLIANCE
-  NST RINGS



Europe

-  AIBIDE
-  DAEMON
-  B B G OPEN
-  TeraFlow
-  flexa-X
-  DEDICAT 6G
-  RISE-6G
-  REINDEER 6G BRAINS
-  MARSAL
-  6GSNS

FI •  Genesis

DE • 6G Hubs
Other and other countries national initiatives (*)

Asia

CN •  MIIT

•  中华人民共和国科学技术部
Ministry of Science and Technology of the People's Republic of China

•  未来移动通信论坛
FUTURE MOBILE COMMUNICATION FORUM

KR •  Ministry of Science and ICT

•  5G Forum

•  ETRI
Electronic and Information Technological Research Institute

JP •  MIC
Ministry of Internal Affairs and Communications

•  IOWN
GLOBAL FORUM

IN •  tsdsI

6G Status

6G in the global R&I domain

No declared commercial initiative yet

No globally established vision. 5G-PPP EU vision June 2021

Based on convergence/twinning

→ Physical + Digital + Human worlds

A number of technologies investigated world wide

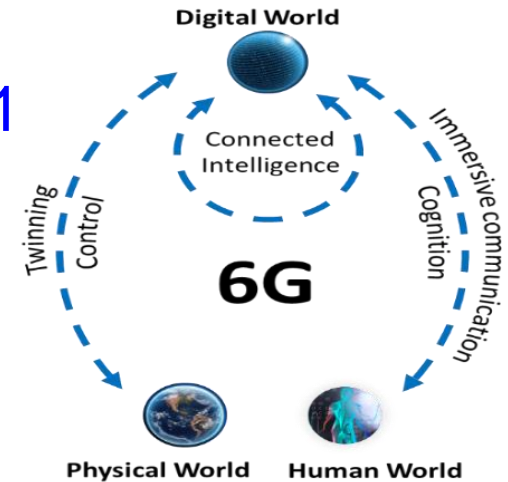
Targets:

beyond 5G capabilities for verticals + totally new application domains

Step change in performance with AI, blockchain...

Systematic addressing of sustainability issues

→ Opportunities for Europe to shape the future 6G landscape.



6G: a new global framework

Important changes since the early days of 5G R&I :

Geopolitics:

Cybersecurity and the strategic importance of connectivity platforms

Amplified by Covid and economic activity shifting on line

Covid has exacerbated supply chains issues, also the war in Ukraine;

→ Reinforced need to **address a complete supply chain**, including micro electronics (Chip Act)

Industry

Regional policies to reconstruct a strategic industry

Multiplicity of new players (hyperscalers) in the wake of Open Networking approaches

→ Europe need to **consolidate its leadership** with cloud and edge supply capabilities

Users.

Raising importance of verticals and users beyond the classical MNO's

→ Need to take an **holistic perspective** from the onset (not add on)



6G R&I in Europe

6GSNS

5G PPP bridging phase

5G PPP

- The Hexa-X flagship + 9 6G exploratory projects = 65 M€



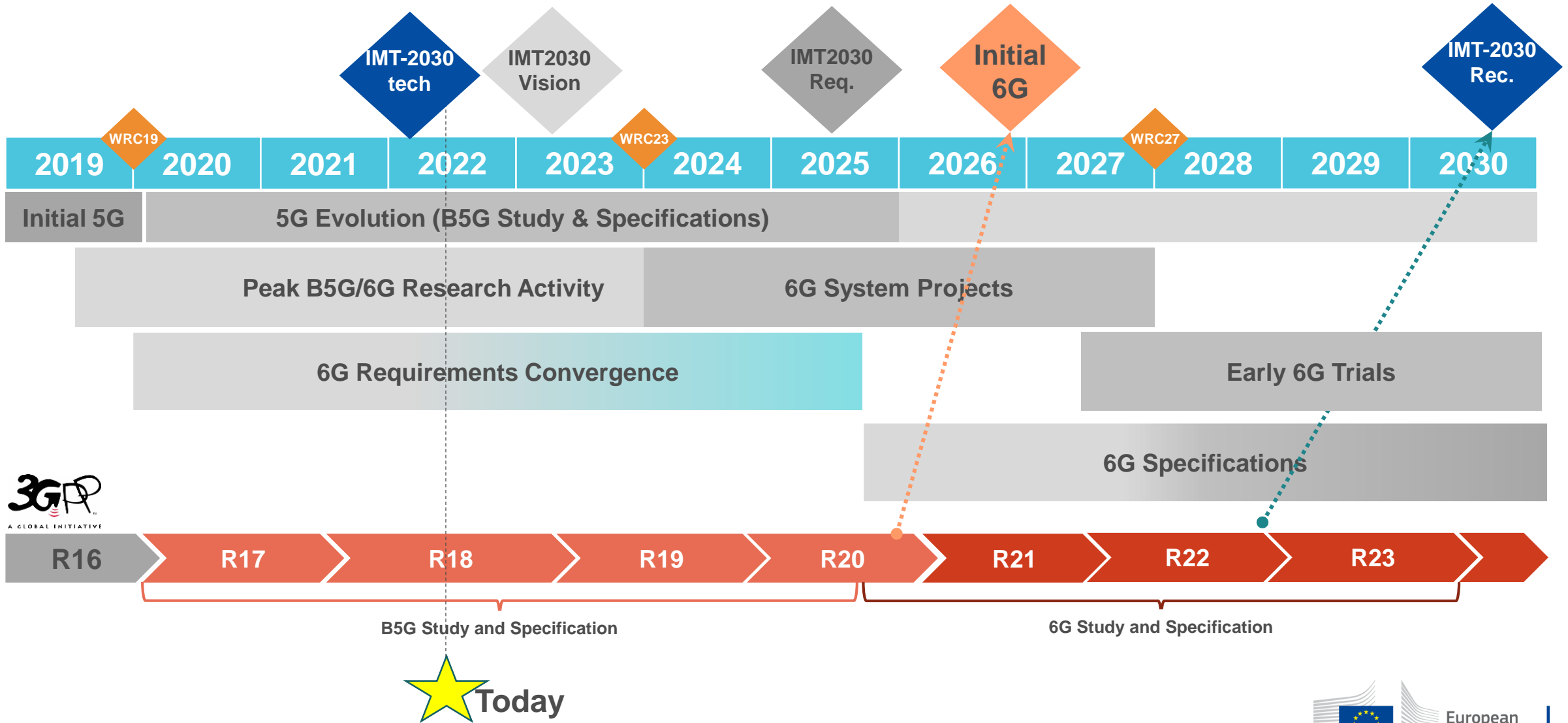
Accelerating 5G Deployment
Connecting Europe Facility (CEF2)

6GSNS

6G Vision and R&I across the
broader supply chain

- Established as an EU legal entity
 - EU upfront commitment of **€900M** between 2021-2027 (to be at least matched by industry)
 - Close involvement of Member States for strategic guidance / liaison with National Programmes
- ➔ **SNS as a vehicle for European and International cooperation**

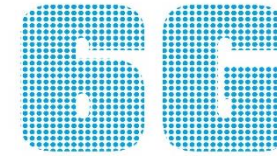
A possible B5G/6G Timeline



Current SNS Work Programme 2021-2022



Evolution



Stream A (RIA): Smart communication components, systems and networks for 5G mid-term Evolution systems

Radio:

Building Blocks and Systems

System and Security:

Secure Softwarisation
Real-time/ Zero touch
Services

Architecture:

Evolved Design
Advanced Cloud/Edge
Converged Optical Transport

Stream B (RIA): Research for radical technology advancement towards 6G

System
Architecture

Wireless Communication
Technology and Signal Processing

Cross Strand – "Flagship" Project(s)

Trustworthy and Secure
Service Development and
Provision

Communication
Infrastructure
Technologies

Stream D (IA): Large Scale SNS Trials and Pilots with Verticals

Stream C (RIA): SNS experimental infrastructures

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Horizontal Issues: Sustainability,
Access, Affordability...



Work Programme 2023-2024 in preparation (dedicated convened session)

By way of conclusion

- 5G deployment at European scale is a pre-condition of 6G success
- Coordinated EU policies & tools to meet the 5G Digital Decade targets
- Need to accelerate towards the “full 5G” SA mode to reap full benefits
- EU committed to 6G, existing R&I will be amplified by the 6G SNS JU
- Not business as usual: important new tech, political and usage trends
- Important to address a full supply chain, from microelectronics to services
- The two years ahead of us are a window of opportunity to shape 6G
→ **no time to waste.**



Thank You !

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