



Views on 3GPP Stage 1 6G work

Xiaomi

- High level principles
- Key 6G features & use cases
- 3GPP SA1 6G stage 1 study planning
- ANNEX
 - Overview of SA1 5G Requirements Development
 - Observations of SA1 5G Requirements Development
 - Illustration of 3GPP Rel-20 timeline (SWS-240025)
 - Potential drivers for 6G (SWS-240025)

High level principles

Evolution than Revolution

Incubation of 6G killer applications from 5G network

Support basic & major 5G features and services

Optimization and enhancements

Support ITU-R 6G IMT-2030 new usage scenarios

Natively support ISAC, AI/ML, Ubiquitous Connectivity, etc.

Alignment to ITU-R IMT-2030 design principles

Sustainability, security and resilience, connecting the unconnected and ubiquitous intelligence

Key 6G features & use cases

Immersive Communication use cases



Video Streaming

- High data rates
- High reliable transmission
- Wide coverage



Online Gaming

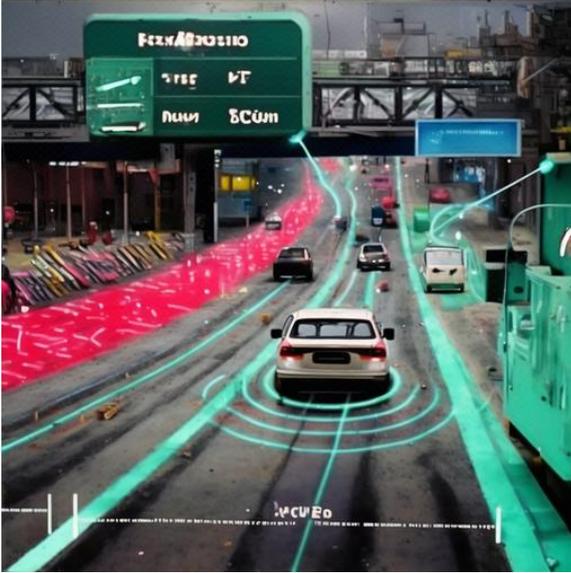
- High data rates
- Low latency
- High reliable transmission
- Wide coverage



Remote Work

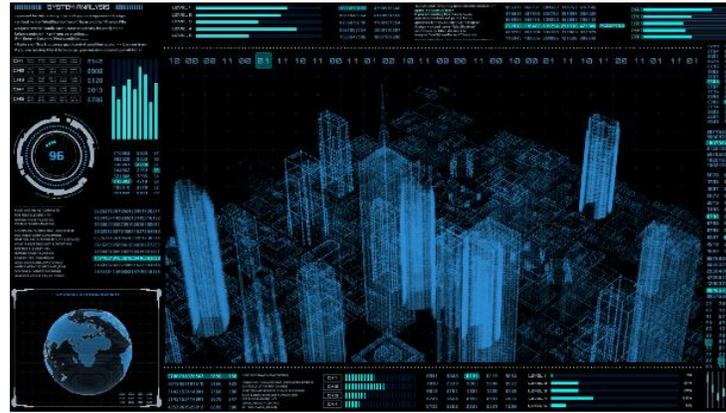
- High data rates
- High reliable transmission
- Wide coverage

ISAC use cases



High resolution map

- High resolution
- High range/angle accuracy
- Large service area



AI assisted sensing

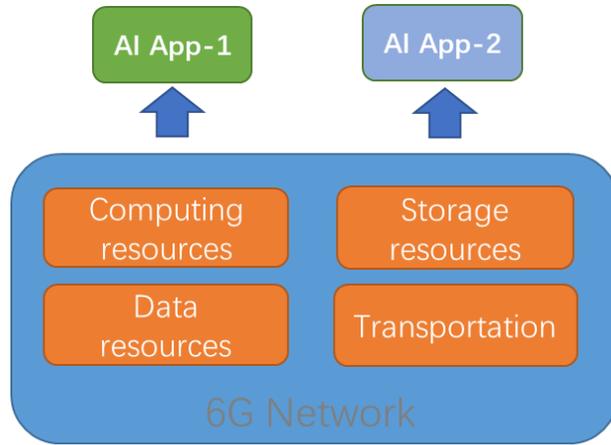
- High resolution
- High range/angle/speed accuracy
- High confidence level
- Low missed detection
- Low false alarm
- Low power consumption



Satellite/airborne sensing

- Large service area
- More spatial/terrestrial detection
- Wide detection range
- Agile deployment

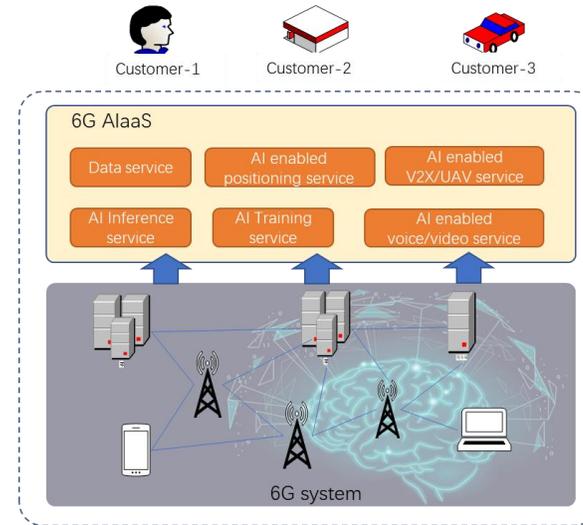
AI use cases



- 6G Network for AI application service

Network for application

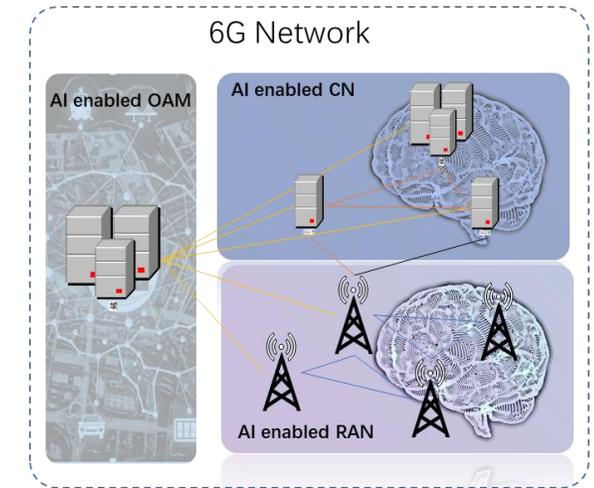
- Fine granularity traffic control / QoS treatment for AI applications (e.g. high data rate & real time transportation)
- Network resource (e.g. computing, storage)



- 6G AI as a Service (AlaaS)

AI as a service (AlaaS)

- Provide 6G AI model training service, 6G AI model inference service for AI costumers, e.g. to enable intelligent automotive services

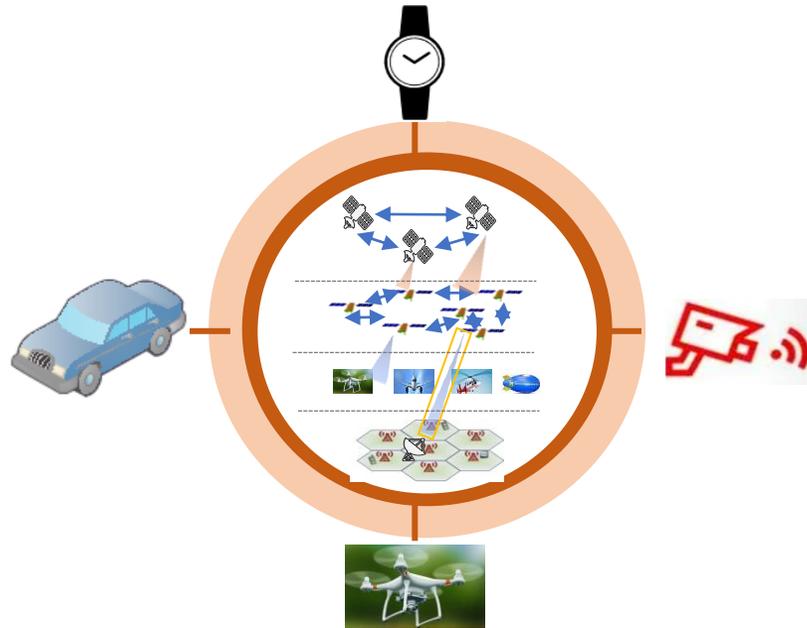


- 6G AI enabled Network

AI enabled for 6G Network

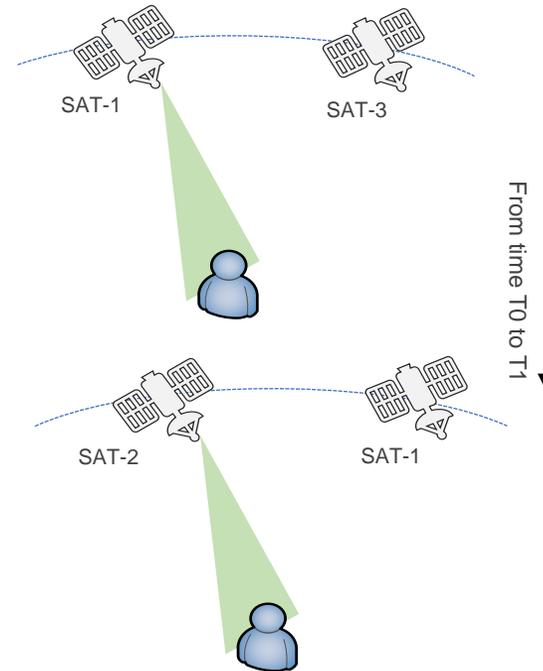
- smart radio resource orchestration to enable e.g. Missive MIMO
- intelligent traffic control e.g., traffic classification and prediction, Intelligent routing
- AI enabled network maintenance

Ubiquitous connectivity use cases



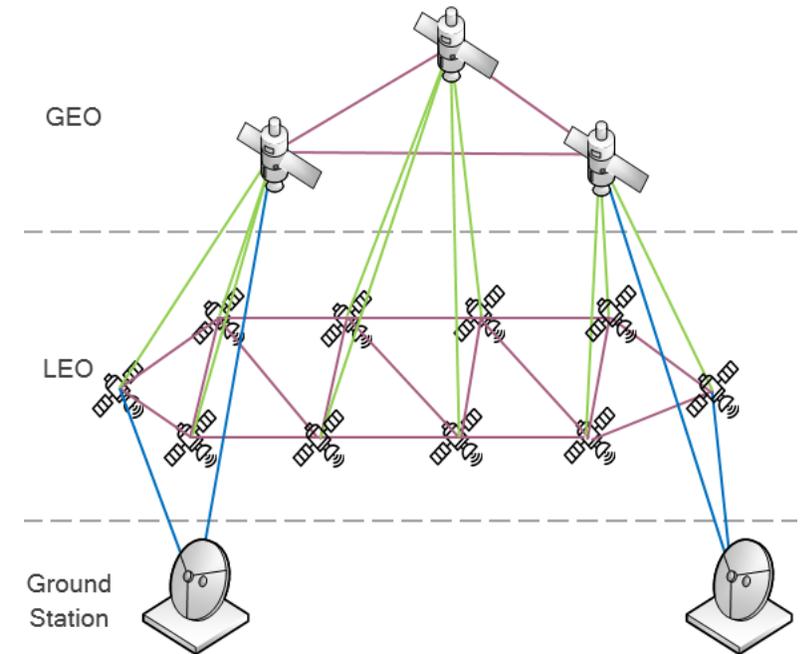
Integrated Satellite-Terrestrial Communication

- Ubiquitous cell coverage (TN/HAPs/LEOO/GEO, etc)
- Heterogeneous UE type
- Elastic and reconfigurable network
- Unified Air interface
- Smart Spectrum share



AI enabled predictive Satellite Cell Movement

- Mobility predictive based on ephemeris, beam footprint and UE trajectory enabled by AI
- Power efficiency
- Radio resource efficiency
- Measurement mitigation



Multi-orbit coordination

- Boost UE data rate
- Mobility enhancement
- High reliability

Security requirements



Inclusive authentication

- User and device identifiable
- Circumstance (e.g. connectivity, capability) resilient
- Zero trust supportive
- PQC robust with 256-bit algos

Unified authorization

- One framework for various verification purposes
- All stakeholders involved
- Finer granularity permission
- Revocable control

Dynamic privacy

- User controllable
- Real time contactable
- Feature or service adaptable
- Conditional exposure

Security for enhanced mobility

- Lightweight key synchronization for faster handover
- Sustainable backward and forward key separation
- Protection for lower layer mobility signaling

3GPP SA1 6G stage 1 study planning

■ Option 1: One umbrella SID to follow 5G approach

- Step 1: Use case study (15 months)
 - All use cases proposed under a single umbrella SID which were finally categorized into several groups
- Step 2: Building block development (3 months)
 - BB generated based on the Step 1 use case grouping
 - Identify functional requirements and performance requirements

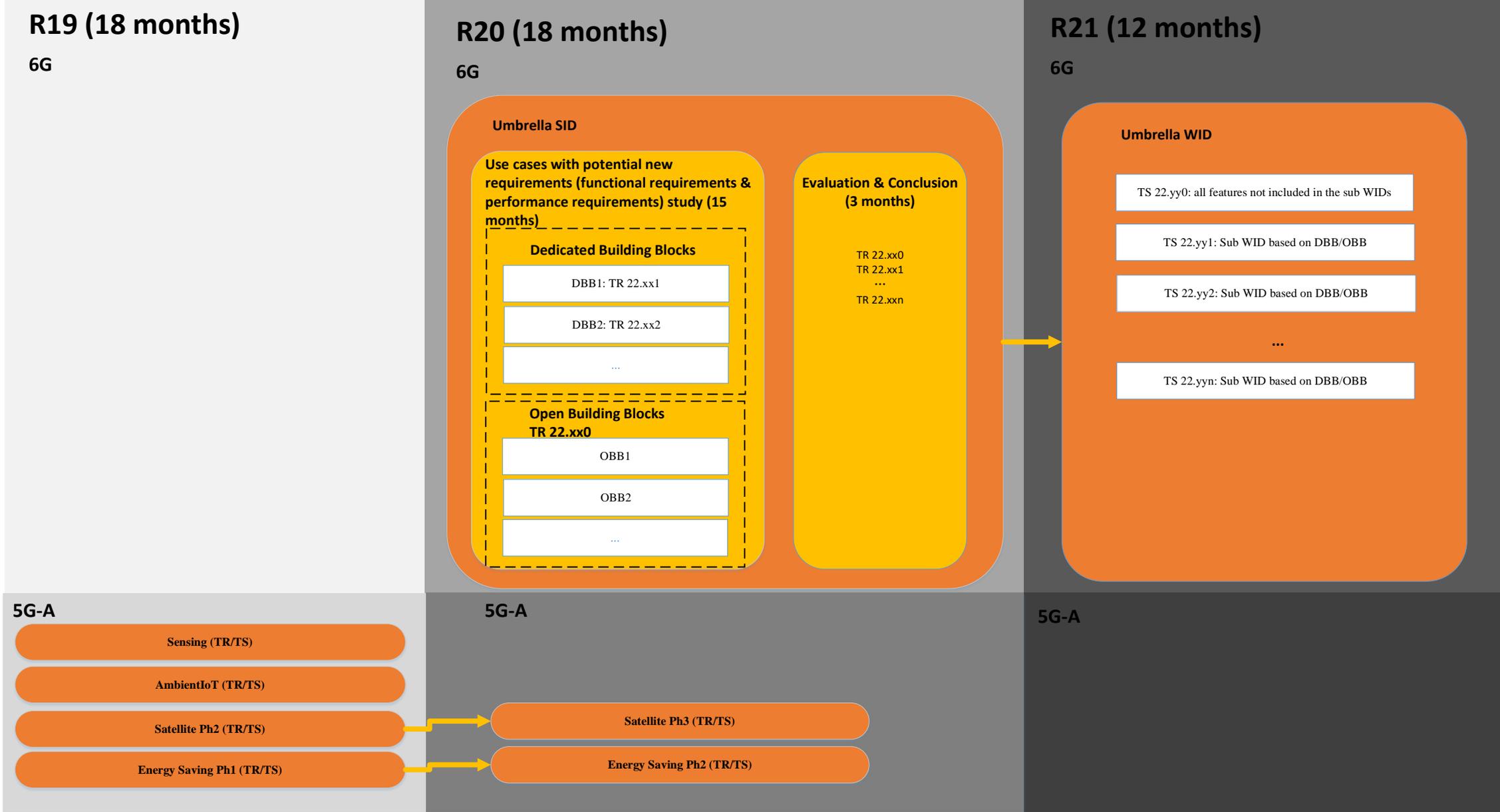
■ Option 2: Multiple SIDs to follow ITU-R 6G IMT-2030 usage scenarios and design principles

- Step 1: Multiple SIDs created (12 months), including e.g. Immersive Communication, ISAC, AI, Ubiquitous connectivity, Security (tbd), Sustainability/Energy Efficiency, etc.
- Step 2: More SIDs (e.g. at most 4) created driven by company contributions (3 months)
- Step 3: Evaluation & Conclusion (3 months)
 - Figure out BBs to move forward to TS

■ Option 3: One umbrella SID including multiple Defined Building Blocks and multiple Open Building Block

- Step 1: Use cases, potential new requirements (functional requirements and performance requirements) (15 months)
 - Multiple defined Building Blocks to follow ITU-R 6G IMT-2030 usage scenarios and design principles, e.g. Immersive Communication, ISAC, AI, Ubiquitous connectivity, Security (tbd), Sustainability/Energy Efficiency, etc.
 - Multiple Open Building Blocks to allow for other use cases
- Step 2: Evaluation & Conclusion (3 months)
 - Figure out BBs to move forward to TS

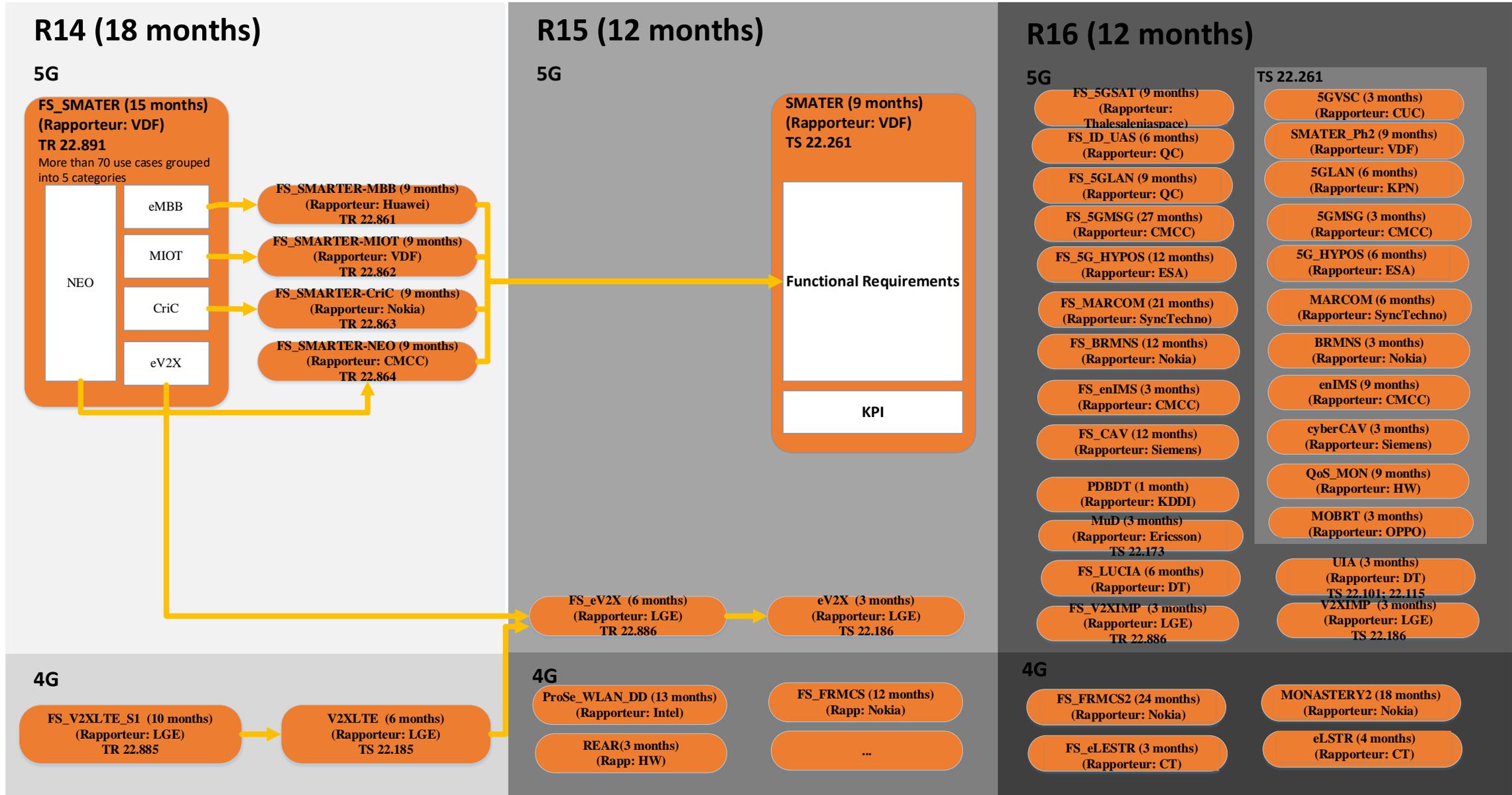
Proposal of SA1 R20/R21 Requirements Development



ANNEX:

- Overview of SA1 5G Requirements Development
- Observations of SA1 5G Requirements Development
- Illustration of 3GPP Rel-20 timeline (SWS-240025)
- Potential drivers for 6G (SWS-240025)

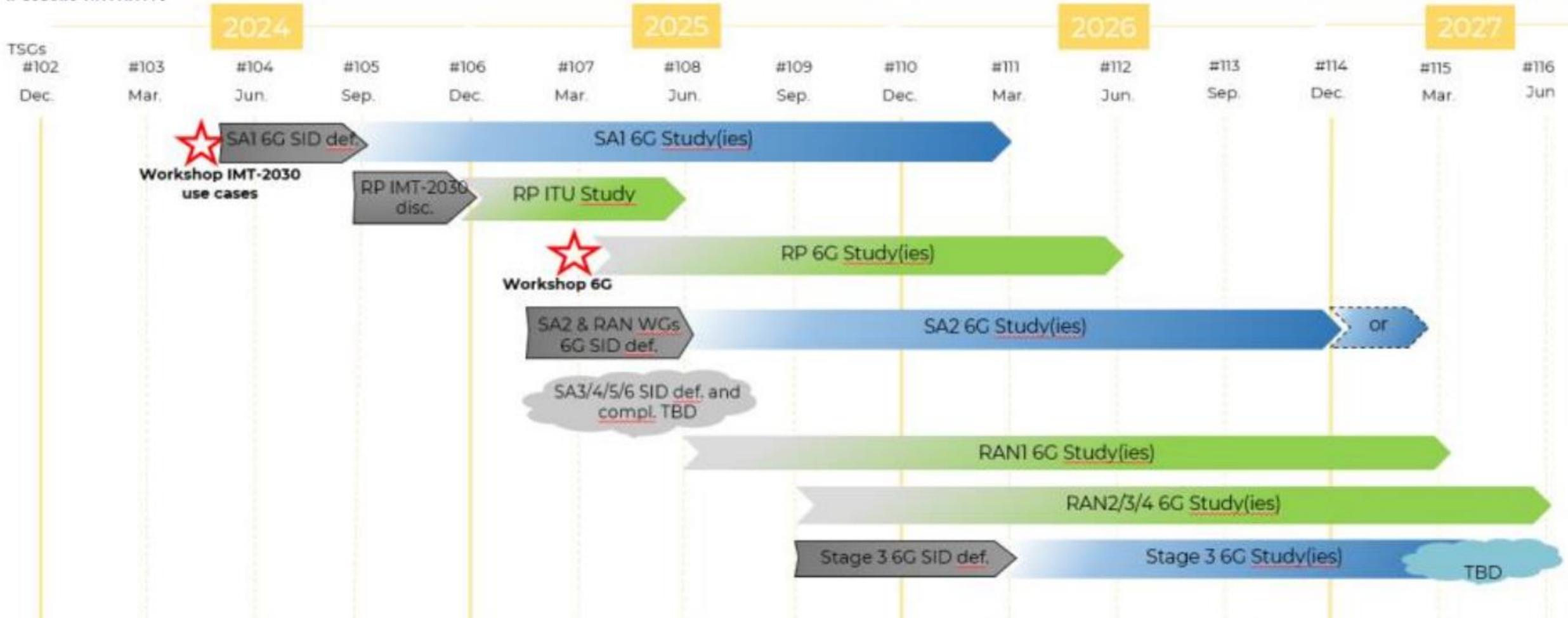
Overview of SA1 5G Requirements Development



Observations of SA1 5G Requirements Development

- Study of 5G requirement started from R14 where 4G stage 1 requirements were proposed in the same release
- All 5G use cases were proposed under a single umbrella SID (FS_SMARTER), which were finally categorized into 5 groups. 4 building blocks were generated from them, 3 of which fully aligned with the 3 scenarios defined by IMT-2020.
- In the same release, traffic scenarios in greater details were explored under the BB based on the use cases defined in the umbrella SID
 - Consolidation of Potential Requirements were developed under each BB, which provided the basis of technical requirements of 5G.
- Time schedule: **30 months** spreading over 2 releases
 - Study: **18 months** (R14)
 - Technical specification: **12 months** (R15)
- Some requirements were derived from both 4G study and 5G study, e.g. eV2X.

Illustration of 3GPP Rel-20 timeline



IMT-2030 Technical Performance Requirements



Requirements, evaluation criteria and submission templates



Tech proposals
Workshop on technology proposals

Some Potential Drivers for 6G: A table view

	Security	AI	Immersive Com	Sustainability, Energy Efficiency	Ubiquitous and resilient coverage	Sensing	"Smart life"	Native Vo6G	FWA-FWC	LPWA	Northbound API	Healthcare	Autonomous Driving	Positioning	Backward Compatibility
GSMA	✓	✓	✓	✓			✓								
NGMN	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓		✓
5GAA	✓	✓	✓	✓	✓	✓							✓	✓	
5G-ACIA	✓	✓	✓	✓		✓					✓				✓
5G-MAG	✓	✓	✓	✓	✓	✓	✓				✓				
GSOA	✓				✓								✓		
TCCA	✓	✓			✓										✓
WBA	✓	✓				✓									
B5GPC	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	
6GForum	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	
IMT-2030RG	✓	✓	✓	✓	✓	✓	✓							✓	
B6GA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NextGA	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	
6GSNS-ICE	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	
ITU	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	

Note:
Non-exhaustive list, showing the topics appearing in at least two presentations



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