

ARTES 4.0 PLANNED ACTIVITIES SUMMARY TABLE (AT, ScyLight, 4S and 5G/6G)

Activity Ref.	Title	Cost	Classification	Cost (K€) (Baseline)	Cost (K€) (Request)	Proc. Policy	Intended ITT issue quarter / intended ITT issue week	Closing date ITT	ITT (re-)issued	Status comment	originally approved in Work Plan
ADVANCED TECHNOLOGIES											
SYSTEM/ NETWORK / PROTOCOLS											
System, Networking and Management											
3A.118	Satellite communication test-bed on-board the International Space Station	3,000	R	0	3,000	C	n/a				2020
3A.120	5G network functions, protocols and security for 5G satellite nodes	850	B	850	0	C			Y	evaluation	2020
3A.121	Satellite telemetry and control using space IoT networks for small satellites	750	B	750	0	C2			Y	awarded / negotiation	2020
3A.137	Test bed for M2M/IoT receiver development	1,000	B	1,000	0	C1		02/12/21	Y		2021
3A.138	Protocol-aware smart gateway diversity techniques	500	R	0	500	C	n/a				2021
3A.139	VHTS system emulator based on functional modelling of the system	400	B	400	0	C			Y	evaluation	2021
3A.152	Inter-satellite links dimensioning in satellite constellation systems	400	R	0	400	C	n/a				2022
3A.153	Frequency coordination demonstrator for non-geostationary satellite systems	800	R	0	800	C				awaiting IPC approval	2022
3A.157	Path awareness techniques for transport protocols over satellite	800	B	800	0	C				awaiting IPC approval	2022
3A.159	Joint communication and edge computing load balancing techniques for satellite networks	400	B	400	0	C				awaiting IPC approval	2022
	subtotal	8,900		4,200	4,700						
Propagation											
3B.046	Alphasat Q/V band communication experiments covering mobile and non-GEO use cases	800	B	800	0	C2	week 4 2022				2021
3B.047	Modelling VHF propagation (100 - 300 MHz) effects for current and future satellite systems	600	R	0	600	C	n/a			awaiting IPC approval	2022
	subtotal	1,400		800	600						
Coding, Modulation and Access											
3C.024	System demonstrator of non-orthogonal multiple access over satellite (<i>initiation requested by DE</i>) (*)	500	B	500	0	C2	week 48				2021
3C.027	Precoding for low earth orbit satellite systems	400	R	0	400	C	n/a				2022
3C.029	Joint satellite communications and radio frequency remote sensing air interface	800	B	800	0	C				awaiting IPC approval	2022
3C.030	Uncoordinated Satellite Access Scheme over-the-air Demonstration in Maritime VHF Bands	600	R	0	600	C	n/a			awaiting IPC approval	2022
	subtotal	1,300		1,300	0						
Small Satellites											
3E.001	Smallsat platform with self-transfer capability into geosynchronous orbit	4,000	R	0	4,000	C	n/a				2021
3E.002	In-orbit experiment of beyond line-of-sight ground to LEO links using ionospheric refraction	1,200	R	0	1,200	C1	n/a				2021
3E.003	In-orbit experiment of an inflatable de-orbiting drag device for small satellites	4,000	R	0	4,000	C	n/a				2021
3E.004	In-orbit experiment of communication links in candidate satellite frequencies	1,100	B	1,100	0	C			Y	evaluation	2021
3E.008	In-orbit test bed for AI using hardware-acceleration-assisted signal processing of random access protocol signals	3,000	B	3,000		C1				awaiting IPC approval	2022
	subtotal	13,300		4,100	9,200						
SPACE SEGMENT - PLATFORM											
Platform - System and Architecture											
4A.084	Artificial intelligence for augmented reality in satcom assembly, integration and test	500	B	500	0	C			Y	evaluation	2021
4A.085	Critical breadboarding enabling the removal of failed small satellites from low earth orbit	800	R	0	800	C	n/a				2021

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4A.086	On-board health monitoring system for satcom	800	B	800	0	C			Y	evaluation	2021
4A.090	Event-based electron belt radiation storm environments modelling	500	B	500	0	C2				awaiting IPC approval	2022
4A.091	Fast-lock interconnections and connectorless flat cables for satcoms	500	B	500	0	C1				awaiting IPC approval	2022
4A.092	Urag and atomic oxygen resistant carbon fibre reinforced polymer for very low Earth orbit telecom antennas	750	R	0	750	C	n/a			awaiting IPC approval	2022
	subtotal	3,850		2,300	1,550						
Propulsion System											
4B.158	Tether based system for passive telecom spacecraft deorbiting within around 100 days (<i>initiation requested by FI</i>) (*)	550	B	550	0	C1	week 48				2020
4B.167	Smart propellant tank	1,000	B	1,000	0	C				awaiting IPC approval	2022
4B.168	Embedded thrust vector tilting technology based on smart devices	800	B	800	0	C1				awaiting IPC approval	2022
	subtotal	550		550	0						
AOCS											
4C.056	Guidance, navigation and control of in-orbit assembly of large antennas (re-issue)	800	B	800	0	C	week 50		Y	to be re-issued	2020
4C.060	Autonomous and optimised orbit control management for a satellite cluster (<i>initiation requested by DE</i>) (*)	750	B	750	0	C		30/11/21	Y		2021
	subtotal	1,550		1,550	0						
Thermal System											
4D.072	Heat exchanger for a loop heat pipe condenser	650	B	650	0	C		26/11/21	Y		2021
4D.073	ElectroHydroDynamic enhancement of two-phase ammonia heat transport systems	750	B	750	0	C		09/12/21	Y		2021
4D.078	Flexible joint for axial grooved ammonia heat pipes	500	B	500	0	C				awaiting IPC approval	2022
	subtotal	1,900		1,900	0						
Mechanical System											
4E.080	Bearing technology enabling European low micro-vibration reaction wheels	700	B	700	0	C1			Y	evaluation	2021
4E.081	Advanced manufacturing of rotors for reaction wheels	400	B	400	0	C1		08/02/22	Y		2021
4E.085	Low noise sliprings for solar array drive mechanisms	500	B	500	0	C				awaiting IPC approval	2022
4E.086	End-to-end manufacturing and integration processes for standardised ball bearings in telecom satellites	500	B	500	0	C				awaiting IPC approval	2022
4E.087	Evaporation modelling for long life mechanisms used in geostationary satellites	650	R	0	583	C1	n/a			awaiting IPC approval	2022
	subtotal	2,683		2,100	583						
Power System											
4F.140	Solar array to power directly an electrical propulsion system	600	B	600	0	C			Y	proposed for cancellation	2020
4F.145	Batteries based on European commercial of the shelf battery cell technology	800	R	0	800	C1	n/a				2021
4F.146	Extension of electrical power system voltage to 300V	600	R	0	600	C	n/a				2021
4F.147	Critical building blocks for future lightweight flexible solar array	1,200	B	1,200	0	C		21/01/22	Y		2021
4F.153	Compact power control module with digital control	750	B	750	0	C				awaiting IPC approval	2022
4F.154	Additive manufacturing for multifunctional battery packaging	500	R	0	500	C2	n/a			awaiting IPC approval	2022
	subtotal	3,200		1,800	1,400						
Command and Data Handling											
4G.035	Memory control sub-system for low earth orbit applications	700	B	700	0	C	week 48				2021

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4G.036	Critical functions controller for low earth orbit satellites	800	B	800	0	C	week 5 2022				2021
4G.037	Multiple access sequences for satellite constellations without centralised management	600	B	600	0	C		17/02/22	Y		2021
	subtotal	2,100		2,100	0						
Small Satellite Platform Equipment											
4H.005	Small Satellite Standard enabling multi launch from heavy lift launch vehicles	750	B	750	0	C1				awaiting IPC approval	2022
4H.006	Thermoplastic small satellite platform	800	B	800	0	C				awaiting IPC approval	2022
	subtotal	1,550		1,550	0						
SPACE SEGMENT - PAYLOAD											
Antenna											
5B.203	Distributed, modular active antenna with close-to aperture conversion and processing	700	B	700	0	C		18/02/22	Y		2020
5B.207	Planar, compact and highly integrated active antenna for low earth orbit applications	850	B	850	0	C			Y	evaluation	2021
5B.208	Reconfigurable passive multibeam antennas for next generation of LEO satellites	750	B	750	0	C		08/12/21	Y		2021
5B.215	Demonstrator of a reconfigurable V-band feeder link multibeam antenna for high capacity geostationary satellites	1,100	B	1,100	0	C				awaiting IPC approval	2022
5B.216	Demonstrator of a transmit dual polarised active antenna with large scan angle for Low Earth Orbit applications	1,100	B	1,100	0	C				awaiting IPC approval	2022
	subtotal	4,500		4,500	0						
Repeater Equipment											
5C.410	Low voltage, high current power converter for high power integrated circuits (<i>re-issue</i>)	500	B	500	0	C			Y	negotiation	2020
5C.411	Lead-free assembly technologies for telecom satellite equipment	600	B	600	0	C			Y	awarded	2020
5C.412	W-band high power amplifier based on semiconductor technology	800	B	800	0	C1			Y	awarded	2020
5C.425	European resin for high voltage and high temperature space applications	600	B	600	0	C			Y	evaluation	2021
5C.426	Light weight insulating coating techniques for high voltage power converters	800	B	800	0	C	week 48				2021
5C.427	Compact high voltage, high switching frequency power converter for travelling wave tubes	750	B	750	0	C		11/01/22	Y		2021
5C.428	Generic frequency settable oven controlled crystal oscillator	500	B	500	0	C		12/01/22	Y		2021
5C.429	Power flexible amplifier with enhanced back off efficiency for active antenna arrays	750	B	750	0	C			Y	evaluation	2021
5C.430	Broadband tuneable Ka-band frequency multiplexers	800	R	0	800	C	n/a				2021
5C.431	Ku- and Ka-band filters for transmit and receive active antennas	600	B	600	0	C		01/12/21	Y		2021
5C.432	W-band integrated active receive front-end	850	B	850	0	C	week 5 2022				2021
5C.433	V-band integrated active receive front-end	750	B	750	0	C		14/01/22	Y		2021
5C.434	Substrate embedded filters for microwave equipment	500	B	500	0	C			Y	awarded	2021
5C.435	Adaptive compute acceleration platforms for satcom	800	B	800	0	C	week 48				2021
5C.436	Ka-band low noise amplifier with reduced DC power consumption for active antenna applications	750	B	750	0	C		10/12/21	Y		2021
5C.437	Ka- to W-band frequency converter	750	B	750	0	C		24/02/22	Y		2021
5C.438	Efficient, lightweight radiation shielding of electronic components on board GEO spacecraft	500	B	500	0	C2			Y	evaluation	2021
5C.439	Low loss and temperature stable surface acoustic wave filters	650	R	0	650	C2	n/a				2021
5C.440	On chip integrated power converter for advanced field programmable gate arrays	1,000	B	1,000	0	C1		16/12/21	Y		2021
5C.441	Breadboarding of critical technologies enabling VHF data exchange payloads	900	B	900	0	C		20/01/22	Y		2021
5C.443	Ultra deep submicron assessment for on-board digital processors	2,000	R	0	2,000	C	n/a				2021

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5C.428	Generic frequency settable oven controlled crystal oscillator	500	B	500	0	C		12/01/22	Y		2021
5C.456	Power reflection tolerant solid state power amplifier for active antenna applications	900	B	900	0	C				awaiting IPC approval	2022
5C.457	Beam forming chip for direct radiating array antennas for W-band feeder links	1,000	R	0	1,000	C	n/a			awaiting IPC approval	2022
5C.458	Digital predistortion techniques for beamforming and intermodulation improvement of active antennas	750	B	750	0	C				awaiting IPC approval	2022
5C.459	High efficiency mm-wave GaN transistor high power amplifier for G-U and L-U active antenna application	1,500	B	1,500	0	C				awaiting IPC approval	2022
5C.460	Acceptance criteria for defects and ageing effects in high voltage EPC and PPU printed circuit boards	750	R	0	750	C	n/a			awaiting IPC approval	2022
5C.461	Development of high density modular electrical interconnections for high data rate applications	600	B	600	0	C1				awaiting IPC approval	2022
5C.462	Noise shaping techniques for active phased array antenna applications	900	B	900	0	C				awaiting IPC approval	2022
5C.463	Thermally efficient assembling techniques for high frequency GaN switching power supplies for power amplifiers	500	B	500	0	C1				awaiting IPC approval	2022
5C.464	Development of a highly integrated mixed signal Ka-band RF Front end System-In-Package for active antenna	1,200	B	1,200	0	C				awaiting IPC approval	2022
5C.465	L-band gallium nitride low noise amplifier-based RF front-end	700	R	0	700	C	n/a			awaiting IPC approval	2022
5C.466	Microwave photonics voltage controlled oscillator for Q/V/W-band local oscillators	800	B	800	0	C2				awaiting IPC approval	2022
5C.467	Reflectionless RF filters	600	B	600	0	C				awaiting IPC approval	2022
5C.468	Q/V-band dual-polarised waveguide rotary joint	800	B	800	0	C				awaiting IPC approval	2022
		subtotal		27,650	21,750	5,900					
Small Satellite Payload Equipment											
5E.021	High throughput Ka-band integrated analogue and digital system on module	1,000	B	1,000	0	C1		03/01/22	Y		2021
5E.022	Ka-band phased array antenna tile for small satellites	1,500	B	1,500	0	C2				awaiting IPC approval	2022
5E.023	Compact S-band diplexer for small satellites TT&C applications	500	B	500	0	C1				awaiting IPC approval	2022
5E.024	Compact low frequency high power bandpass filter for small telecommunication satellites	600	B	600	0	C1				awaiting IPC approval	2022
5E.025	Connectivity technologies enabling modular deployable Ku/Ka band active antennas for small satellites	800	B	800	0	C1				awaiting IPC approval	2022
5E.026	Deployable mechanisms for multi flat-panel reflectarray antennas for small satellites	750	B	750	0	C2				awaiting IPC approval	2022
		subtotal		5,150	5,150	0					
GROUND SEGMENT											
TT&C/Satellite Ground Equipment and Support											
6A.072	Prototype for measuring NGSO satellite network interference and radiofrequency characteristics	750	B	750	0	C		08/12/21	Y		2021
6A.073	Envelope tracking SSPA prototype	1,000	B	1,000	0	C1		10/12/21	Y		2021
6A.074	Single-chip 71-86 GHz transceiver RFIC for aeronautical satcom applications	800	R	0	800	C1	n/a				2021
6A.075	W-Band highly stable reflector antenna for VHTS feeder links	700	R	0	700	C	n/a				2021
6A.076	On-chip integrated Ka-band diplexer for ground terminals	600	B	600	0	C1	week 5 (2022)				2021
6A.077	Integrated Q/V/W-band passive RF hardware for ground segment network equipment	750	R	0	750	C1	n/a				2021
		subtotal		4,600	2,350	2,250					
Ground Network Operation Control and Gateway											
6B.057	Digital Signal Processing Building Blocks for Satellite Internet of Things Communications	500	R	0	500	C1	n/a				2020
6B.069	Critical components for W-band feeder link applications	600	B	600	0	C		21/02/22	Y		2020
6B.073	Q/V band multibeam active antenna gateway for constellations (initiation requested by IT) (*)	800	B	800	0	C2			Y	evaluation	2020

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6B.084	End-to-end congestion control for broadband networks with satellite-tailored QUIC protocol	600	B	600	0	C		15/02/22	Y		2021
6B.094	Fast locking flange for waveguide connections	500	R	0	500	C	n/a			awaiting IPC approval	2022
6B.095	High speed disruptive tolerant networking node for direct-to-earth optical and RF links	1,000	B	1,000	0	C				awaiting IPC approval	2022
6B.097	Standardized ground software components for orchestrating high throughput satellite services	800	B	800	0	C				awaiting IPC approval	2022
	subtotal	4,800		3,800	1,000						
USER TERMINALS											
7-.046	Dynamic signalling and control of ground terminals with active antennas for interactive services	800	B	800	0	C				awaiting IPC approval	2022
	subtotal	800		800	0						
Professional User Terminals											
7A.070	25W class Ka-band packaged Monolithic Microwave Integrated Circuit GaN amplifier for professional up-link stations	750	B	750	0	C1				awaiting IPC approval	2022
	subtotal	750		750	0						
Consumer User Terminals											
7B.052	User terminal with path diversity for constellations	500	B	500	0	C1			Y	negotiation	2020
7B.058	Wideband DVB-S2x software demodulator running on CPU and/or GPU on consumer hardware platforms	500	B	500	0	C1			Y	negotiation	2021
7B.059	Electronic scanning antenna with reduced complexity for high-value user terminals	650	B	650	0	C1			Y	negotiation	2021
7B.060	Location customized flat antenna with integrated beam pointing for direct to home application	450	B	450	0	C1		16/12/21	Y		2021
	subtotal	2,100		2,100	0						
User Terminals Mobile											
7C.052	Multi-platform Dual Band Configurable Power Amplifier For Avionic Terminals	800	R	0	800	C2	n/a				2020
7C.063	Wirelessly connected textile antennas for smart clothing	500	B	500	0	C1	week 2 2022				2021
7C.065	Ship-borne integrated satellite-terrestrial user terminal for VHF data exchange systems	500	B	500	0	C1		18/11/21	Y		2021
7C.070	Q/V band phased array antennas for ground terminals	1,000	R	0	1,000	C	n/a			awaiting IPC approval	2022
7C.071	Integrated multiple switch-beam array antenna for resilient communication link M2M/IoT applications	750	B	750	0	C1				awaiting IPC approval	2022
7C.072	Direct satellite to vehicle multicasting below 6 GHz based on open standards	700	B	700	0	C				awaiting IPC approval	2022
7C.074	Phased array antennas based on flexible ultra-light materials and printed RF components	700	B	700	0	C1				awaiting IPC approval	2022
	subtotal	4,950		3,150	1,800						
TOTAL (k€)		94,483		65,500	28,983						
OPTICAL COMMUNICATION-SCYLIGHT											
SYSTEM/ NETWORK / PROTOCOLS											
System, Networking and Management											
Propagation											
3B.040	Assessment of analogue optical links through the atmosphere (SL.007)	1,200	B	1,200	0	C			Y	awarded	2020
3B.041	Assessment of reliable high data rate optical links under strong atmospheric turbulence conditions	200	B	200	0	C			Y	negotiation	2020
3B.042	Demonstration of reliable high data rate optical links under strong atmospheric turbulence conditions	1,800	B	1,800	0	C				activity is on hold	2020
3B.043	Reference atmospheric propagation models and data for optical Earth-Space communication links	250	B	250	0	C	week 50				2020
	subtotal	3,450		3,450	0						

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Coding, Modulation and Access											
3C.022	CCSDS standardised ranging for Optical Communication Terminals (SL.028) <i>(re-issue)</i>	400	B	400	0	C				evaluation	2020
	subtotal	400		400	0						
Security and Cryptography											
3D.003	Quantum Key Distribution building blocks (SL.025)	800	B	800	0	C				activity is on hold	2020
	subtotal	800		800	0						
SPACE SEGMENT - PAYLOAD											
Repeater Equipment											
	subtotal	0		0	0						
Optical Repeaters and Photonics											
5F.012	Optical communications and photonics Makerspace (SL.029)	500	B	500	0	C2		08/12/21	Y		2020
5F.013	Integrated Optical Interfaces for RF Phased Array Antennas (SL.030)	600	B	600	0	C				activity is on hold	2020
5F.014	Integrated photon sources for space based quantum telecommunications (SL.031)	750	R	0	750	C	n/a				2020
5F.018	WDM Laser Sources at 1064nm	1000	B	1000	0	C		12/11/21	Y		2021
5F.019	Low-noise optical pre-amplifier at 1064nm	600	B	600	0	C	Q4 2021				2021
5F.020	WDM High-Power Optical Amplifier at 1064nm	2000	B	2000	0	C	Q2 2022				2021
5F.021	WDM High-Power Optical Amplifier at 1550nm	2000	B	2000	0	C			Y	evaluation	2021
5F.022	LEO / GEO Optical Switch Matrix 25x25	7000	B	7000	0	C				activity is on hold	2021
5F.024	100 Gbps free-space experiment using fibre optical transceivers	900	B	900	0	C		06/12/21	Y		2021
5F.028	High extinction ratio amplitude modulators and pulse shaper electronics for quantum key distribution	500	B	500	0	C1	Q2 2022			awaiting IPC approval	2022
5F.029	Packaging of photonics for laser communication terminals	800	B	800	0	C1	Q3 2022			awaiting IPC approval	2022
5F.030	High power coating development for space-based laser communication terminals	500	B	500	0	C2	Q2 2022			awaiting IPC approval	2022
	subtotal	17,150		16,400	750						
Optical Communication Terminals and Equipment											
5G.003	Space qualified faint pulse laser source for quantum key distribution (SL.012)	1300	R	0	1300	C	n/a				2020
5G.007	Low-profile optical head for airborne optical communication terminals (SL.023)	950	B	950	0	C	Q4 2021				2020
5G.014	Scintillation mitigation techniques based on femtosecond pulses for optical feeder uplinks (SL.033)	800	R	0	800	C	n/a				2020
5G.019	Optical technologies for next generation high throughput optical inter-satellite links	500	B	500	0	C			Y	negotiation	2021
5G.027	Wavelength division multiplexer (WDM) and de-multiplexer at 1550 nm for space applications	500	B	500	0		Q2 2022			awaiting IPC approval	2022
	subtotal	4,050		1,950	2,100						
GROUND SEGMENT											
Ground Network Operation Control and Gateway											
6B.090	Machine learning in optical communication systems (SL.047)	250	B	250		C	Q4 2021				2021
	subtotal	250		250	0						
Optical Ground Stations and Equipment											
6C.002	RF and optical hybrid gateway antenna (SL.024)	300	R	0	300	C	n/a				2020
6C.006	Reliable GEO Optical Feeder Link demonstration	2500	B	2500	0	C			Y	negotiation	2021
6C.007	Reliable LEO Optical Feeder Link demonstration	2500	B	2500	0	C	Q2 2022				2021

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6C.008	Aircraft detection system for Optical Ground Stations	500	B	500	0	C	Q4 2021				2021
6C.009	Turbulence monitoring equipment (SL.046)	500	B	500	0	C	Q4 2021				2021
6C.012	Skinakas observatory upgrades for optical and quantum communication	450	B	450	0	C	Q4 2021				2021
6C.013	Holomondas observatory upgrades for optical and quantum communication	450	B	450	0	C	Q4 2021				2021
6C.014	Generic adaptive optics for optical communication and quantum key distribution	1500	B	1500	0	C	Q4 2021				2021
6C.015	Optical ground beacon laser system	700	B	700	0	C2	Q3 2022			awaiting IPC approval	2022
6C.016	Four-quadrant InGaAs avalanche photodiodes for LEO direct-to-Earth optical ground station	500	B	500	0	C2	Q1 2022			awaiting IPC approval	2022
6C.017	Lunar optical uplink beacon and data transmitter	900	B	900	0	C2	Q1 2022			awaiting IPC approval	2022
6C.018	Lunar optical communication photon counting receiver	3,000	R	0	3000	C2				awaiting IPC approval	2022
6C.019	Polychromatic laser guide star system for optical feeder-links	2,000	B	2000	0	C2	Q4 2022			awaiting IPC approval	2022
6C.020	Atmospheric turbulence effect mitigation by secondary mirror actuation	2,000	R	0	2000	C1				awaiting IPC approval	2022
6C.021	Large area nano-wire detector for quantum and optical communication applications.	1,000	B	1000	0	C1	Q1 2022			awaiting IPC approval	2022
		subtotal		18,800	13,500	5,300					
TOTAL (k€)				44,900	36,750	8,150					
SPACE SYSTEMS FOR SAFETY AND SECURITY (4S)											
SYSTEM/ NETWORK / PROTOCOLS											
System, Networking and Management											
3A.136	Integration of satellite and terrestrial railway control networks (4S.006)	800	B	800	0	C			Y	evaluation	2021
3A.149	First phase for System & Services Test Bed	2,000	B	2,000	0	C	Q4 2021				2021
3A.150	Next Generation 4S Satcom Solutions -including possible future components of an EU Connectivity infrastructure	3,000	B	3,000	0	C		12/11/21	Y		2021
3A.154	Satellite-based voice connectivity over IP for the Next Generation Emergency Call (NG eCall) (4S.012)	500	B	500	0	C	Q2 2022			awaiting IPC approval	2022
3A.155	Software simulator for Air/Space Traffic Management via Satellite for hypersonic space planes (4S.013) - On request	400	R	0	400	C				awaiting IPC approval	2022
3A.156	Space system design of satellite constellations, including security aspects for governmental and institutional services (4S.014)	1,000	B	1,000	0	C	Q1 2022			awaiting IPC approval	2022
3A.158	Geospatial information networking techniques for maritime awareness services (4S.015)	600	B	600	0	C1	Q2 2022			awaiting IPC approval	2022
		8,300		7,900	400						
Coding, Modulation and Access											
3C.025	System simulator for UAV terminal development (4S.007)	400	B	400	0	C		29/11/21	Y		2021
3C.028	Protocols for mission critical push-to-talk, data, and video services over LEO constellation networks (4S.016)	800	B	800	0	C				awaiting IPC approval	2022
		subtotal		1,200	1,200	0					
Security and Cryptography											
3D.006	Over the air cryptographic keys exchange for secure governmental satellite communications (4S.008)	600	B	600	0	C			Y	awarded	2021
3D.008	Post Quantum Cryptography Algorithms for Satellite Telecommunication Applications (4S.017)	550	B	550	0	C				awaiting IPC approval	2022
3D.011	Secure space networks for satellite platform and payload control (4S.018)	600	B	600	0	C				awaiting IPC approval	2022
		subtotal		1,750	1,750	0					

ARTES 4.0 PLANNED ACTIVITIES SUMMARY TABLE (AT, ScyLight, 4S and 5G/6G)

Activity Ref.	Title	Cost	Classification	Cost (K€) (Baseline)	Cost (K€) (Request)	Proc. Policy	Intended ITT issue quarter / intended ITT issue week	Closing date ITT	ITT (re-)issued	Status comment	originally approved in Work Plan
SPACE SEGMENT - PAYLOAD											
Repeater Equipment											
5C.469	Trusted Platform Module for SmallSat Platforms (4S.019)	750	B	750	0	C2	Mar-22			awaiting IPC approval	2022
	subtotal	750		750	0						
GROUND SEGMENT											
Ground Network Operation Control and Gateway											
6B.083	Pooling and Sharing interfaces definitions (4S.002)	3,000	B	3000	0	C			Y	negotiation	2020
6B.085	Techniques for intelligent jamming detection and mitigation of satellite IoT gateways (4S.009)	750	B	750	0	C			Y	ITT to be re-issued	2021
6B.093	Aerial mobile platform for last mile geolocation and identification of unauthorised transmitters (4S.020)	750	B	750	0	C	Q1/2 2022			awaiting IPC approval	2022
6B.096	Ground network dimensioning for constellations secure networks (4S.021)	600	B	600	0	C	01/03/22			awaiting IPC approval	2022
	subtotal	5,100		5,100	0						
USER TERMINALS											
User Terminals Mobile											
7C.069	L band unmanned aerial vehicle transceiver for connectivity in all flight phases (4S.022)	750	B	750	0	C	Q2 2021			awaiting IPC approval	2022
7C.073	Compact, reliable multi-band antenna for maritime search and rescue (4S.023)	450	B	450	0	C	Q1/2 2022			awaiting IPC approval	2022
	subtotal	1,200		1,200	0						
TOTAL (k€)		18,300		17,900	400						
SPACE SYSTEMS FOR 5G/6G ACTIVITIES											
5G.01 - STANDARDISATION / LICENSING / REGULATORY SUPPORT											
5G.02 - 5G SYSTEM INFRASTRUCTURE STUDY											
1A.117	Satellite and Integrated Access Backhaul (IAB) - An architectural trade-off (5G)	200	B	200	0	C	week 49				2021
3C.032	Radio performance specification studies for 5G Non-Terrestrial Networks	500	B	500	0	C				awaiting IPC approval	2022
3F.001	System study of large in-orbit-assembled arrays in Frequency Range 1 (FR1) for 5G and Beyond 5G	600	B	600	0	C				awaiting IPC approval	2022
	subtotal	1,300		1,300	0						
5G.03 - 5G NEW RADIO NTN FUNCTIONS/PROTOCOLS DEVELOPMENTS											
3B.044	Wideband channel model for NGSO land mobile services in Ka-band	500	B	500	0	C			Y	proposed for cancellation	2020
3C.023	OpenAirInterface extension for 5G satellite links	600	B	600	0	C			Y	negotiation	2020
3C.035	3GPP New Radio (NR) precoding, multi-antenna and beam management techniques for MSS systems	500	B	500	0	C				awaiting IPC approval	2022
	subtotal	1,600		1,600	0						
5G.04 - 5G CORE NETWORK DEVELOPMENTS											
3A.133	Integration of non-3GPP satellite networks with 5G core networks	500	B	500	0	C				awaiting IPC approval	2022
3A.165	Beyond 5G/6G networking architectures for multi-layered Non-Terrestrial Networks and smart satellites	750	B	750	0	C				awaiting IPC approval	2022
7A.072	Integrated access-backhaul nodes for autonomous and reconfigurable satellite-terrestrial 5G/6G networks	1,000	B	1000	0	C				awaiting IPC approval	2022
	subtotal	2,250		2,250	0						
5G.05 - 5G TESTBED INFRASTRUCTURE											
3C.033	5G New Radio (NR) physical layer demonstrator for railway control communications over satellite	600	B	600	0	C				awaiting IPC approval	2022

ARTES 4.0 PLANNED ACTIVITIES SUMMARY TABLE (AT, ScyLight, 4S and 5G/6G)

Activity Ref.	Title	Cost	Classification	Cost (K€) (Baseline)	Cost (K€) (Request)	Proc. Policy	Intended ITT issue quarter / intended ITT issue week	Closing date ITT	ITT (re-)issued	Status comment	originally approved in Work Plan
3D.005	Security solutions and security test bed for Non-Terrestrial Networks	750	B	750	0	C	week 48				2020
5A.080	Repurposable 5G payload as a service	1,000	B	1000	0	C				awaiting IPC approval	2022
	subtotal	2,350		2,350	0						
5G.06 - 5G UNIVERSAL SATELLITE-TERRESTRIAL USER EQUIPMENT (UE)											
7A.071	On-field reconfigurable notch filter for sub-6GHz interference mitigation	500	B	500	0	C				awaiting IPC approval	2022
7B.055	Reference model for universal satellite-terrestrial 5G user equipment	750	B	750	0	C		02/12/21	Y		2020
7B.056	Reference IP core for universal satellite-terrestrial 5G user equipment	2,000	B	2000	0	C	week 13 2022				2020
7B.057	5G satellite connectivity for commercial off-the-shelf mobile phones	200	B	200	0	C		17/11/21	Y		2020
7B.069	Integrated wideband multiplexer for hybrid satcom/terrestrial 5G user terminals	800	B	800	0	C				awaiting IPC approval	2022
7C.061	Ka-band antenna for universal satellite-terrestrial 5G land mobile terminals	750	R	0	750	C	n/a				2020
7C.062	Automotive S-band antenna for satellite IoT and 5G terrestrial communications	500	R	0	500	C	n/a				2020
	subtotal	5,000		3,750	1,250						
5G.07 - 5G HUB OVER-THE-AIR DEMONSTRATIONS											
2-019	5G Hub over-the-air vertical segment validations	1,500	B	1500	0	C			Y	ITT to be re-issued	2020
	subtotal	1,500		1,500	0						
5G.08 - 5G SATELLITE PROOF-OF-CONCEPT MISSIONS											
2-020	Demonstration of an experimental 5G g-NodeB in space	4,500	B	4500	0	C	Q1 2022				2020
2-021	Demonstration of direct 5G broadband access from LEO to small aperture terminals	3,500	B	3500	0	C		02/03/22	Y		2020
3A.065	Beyond 5G/6G networking architectures for multi-layered Non-Terrestrial Networks and smart satellites	750	B	750	0	C				awaiting IPC approval	2022
3C.034	Digital Twin for Beyond 5G (B5G) and 6G satcom radio links	1,000	B	1000	0	C				awaiting IPC approval	2022
3F.002	D-band satellite links for 6G	450	B	450	0	C					2022
5C.472	D-band payload building blocks for 6G satellite systems	800	B	800	0	C				awaiting IPC approval	2022
	subtotal	11,000		11,000	0						
TOTAL (k€)		21,350		20,100	1,250						

(*) R activity for which a request for initiation has been received

Please note: **Baseline (B)**: these activities will be automatically initiated.

On Delegation Request (R): these activities will only be initiated on the explicit request of at least one delegation.