

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.122	Satellite signal processing using an off-the-shelf AI chipset	500	B	500	0	C1			Y	awarded	2020
3A.137	Test bed for M2M/IoT receiver development	1,000	B	1,000	0	C1		02/12/2021	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		08/10/2021	Y		2021
	subtotal	7,000		3,500	3,500						
Propagation											
3B.046	Alphasat Q/V band communication experiments covering mobile and non-GEO use cases	800	B	800	0	C2	week 46				2021
	subtotal	800		800	0						
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
	subtotal	500		500	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
	subtotal	10,300		1,100	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		29/10/2021	Y		2021
4A.085	Critical breadboarding enabling the removal of failed small satellites from low earth orbit	800	R	0	800	C	n/a				2021
4A.086	On-board health monitoring system for satcom	800	B	800	0	C		13/10/2021	Y		2021
	subtotal	2,100		1,300	800						
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 42				2020
	subtotal	550		550	0						
AOCS											
4C.056	Guidance, navigation and control of in-orbit assembly of large antennas	800	B	800	0	C			Y	evaluation	2020
4C.060	Autonomous and optimised orbit control management for a satellite cluster (<i>initiation requested by DE</i>) (*)	750	B	750	0	C		30/11/2021	Y		2021
	subtotal	1,550		1,550	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
Thermal System											
4D.072	Heat exchanger for a loop heat pipe condenser	650	B	650	0	C		12/11/2021	Y		2021
4D.073	ElectroHydroDynamic enhancement of two-phase ammonia heat transport systems	750	B	750	0	C		09/12/2021	Y		2021
	subtotal	1,400		1,400	0						
Mechanical System											
4E.080	Bearing technology enabling European low micro-vibration reaction wheels	700	B	700	0	C1		12/11/2021	Y		2021
4E.081	Advanced manufacturing of rotors for reaction wheels	400	B	400	0	C1	week 48				2021
4E.082	Dry lubrication system for long life mechanisms	400	B	400	0	C			Y	awarded	2021
	subtotal	400		400	0						
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	week 41				2021
	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
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	week 41				2021
	subtotal	2,100		2,100	0						
SPACE SEGMENT - PAYLOAD											
Antenna											
5B.203	Distributed, modular active antenna with close-to aperture conversion and processing	700	B	700	0	C			Y	ITT to be re-issued	2020
5B.207	Planar, compact and highly integrated active antenna for low earth orbit applications	850	B	850	0	C		19/10/2021	Y		2021
5B.208	Reconfigurable passive multibeam antennas for next generation of LEO satellites	750	B	750	0	C		08/12/2021	Y		2021
	subtotal	2,300		2,300	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	negotiation / awarded	2020
5C.412	W-band high power amplifier based on semiconductor technology	800	B	800	0	C1			Y	negotiation / awarded	2020
5C.413	Efficient digital beamforming techniques for on-board digital processors	750	B	750	0	C			Y	awarded	2020
5C.425	European resin for high voltage and high temperature space applications	600	B	600	0	C		26/10/2021	Y		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	week 43				2021
5C.429	Power flexible amplifier with enhanced back off efficiency for active antenna arrays	750	B	750	0	C		27/10/2021	Y		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			Y	evaluation	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		14/01/2022	Y		2021
5C.434	Substrate embedded filters for microwave equipment	500	B	500	0	C			Y	negotiation	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		12/11/2021	Y		2021

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
5C.437	Ka- to W-band frequency converter	750	B	750	0	C	week 44				2021
5C.438	Efficient, lightweight radiation shielding of electronic components on board GEO spacecraft	500	B	500	0	C2		29/10/2021	Y		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		06/12/2021	Y		2021
5C.441	Breadboarding of critical technologies enabling VHF data exchange payloads	900	B	900	0	C	week 45				2021
5C.443	Ultra deep submicron assessment for on-board digital processors	2,000	R	0	2,000	C	n/a				2021
5C.482	Generic frequency settable oven controlled crystal oscillator	500	B	500	0	C			Y	evaluation	2021
	subtotal	16,900		13,450	3,450						
Small Satellite Payload Equipment											
5E.021	High throughput Ka-band integrated analogue and digital system on module	1,000	B	1,000	0	C1		11/10/2021	Y		2021
	subtotal	1,000		1,000	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		08/12/2021	Y		2021
6A.073	Envelope tracking SSPA prototype	1,000	B	1,000	0	C1		12/11/2021	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			Y	evaluation	2020
6B.073	Q/V band multibeam active antenna gateway for constellations (<i>initiation requested by IT</i>) (*)	800	B	800	0	C2		12/10/2021	Y		2020
6B.084	End-to-end congestion control for broadband networks with satellite-tailored QUIC protocol	600	B	600	0	C	week 41				2021
	subtotal	2,500		2,000	500						
USER TERMINALS											
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	evaluation	2021
7B.060	Location customized flat antenna with integrated beam pointing for direct to home application	450	B	450	0	C1		18/11/2021	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 50				2021
7C.065	Ship-borne integrated satellite-terrestrial user terminal for VHF data exchange systems	500	B	500	0	C1		18/11/2021	Y		2021

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
subtotal		1,000		1,000	0						
TOTAL (k€)		60,300		39,200	21,100						
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	negotiation	2020
3B.041	Assessment of reliable high data rate optical links under strong atmospheric turbulence conditions (SL.013)	200	B	200	0	C			Y	negotiation	2020
3B.042	Demonstration of reliable high data rate optical links under strong atmospheric turbulence conditions (SL.015)	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 (SL.026)	250	B	250	0	C	week 42				2020
subtotal		3,450		3,450	0						
Coding, Modulation and Access											
3C.022	CCSDS standardised ranging for Optical Communication Terminals (SL.028) (re-issue)	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.007	Optical multiplexing for Wavelength Division Multiplexing (WDM) on optical communication terminals (SL.018)	300	B	300	0	C			Y	awarded	2020
5F.012	Optical communications and photonics Makerspace (SL.029)	500	B	500	0	C2		08/12/2021	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		29/10/2021	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		06/12/2021	Y		2021
subtotal		15,650		14,900	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

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
subtotal		3,550		1,450	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
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	Holomonadas 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
subtotal		8,700		8,400	300						
TOTAL (k€)		32,800		29,650	3,150						
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		20/10/2021	Y		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		12/11/2021	Y		2021
subtotal		5,800		5,800	0						
Coding, Modulation and Access											
3C.025	System simulator for UAV terminal development (4S.007)	400	B	400	0	C		29/11/2021	Y		2021
subtotal		400		400	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
subtotal		600		600	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
subtotal		3,750		3,750	0						
TOTAL (k€)		10,550		10,550	0						
SPACE SYSTEMS FOR 5G/6G ACTIVITIES											
5G.01 - STANDARDISATION / LICENSING / REGULATORY SUPPORT											
5G.02 - 5G SYSTEM INFRASTRUCTURE STUDY											

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
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
	subtotal	1,100		1,100	0						
5G.04 - 5G CORE NETWORK DEVELOPMENTS											
5G.05 - 5G TESTBED INFRASTRUCTURE											
3D.005	Security solutions and security test bed for Non-Terrestrial Networks	1,500	B	1500	0	C	week 42				2020
	subtotal	1,500		1,500	0						
5G.06 - 5G UNIVERSAL SATELLITE-TERRESTRIAL USER EQUIPMENT (UE)											
7B.055	Reference model for universal satellite-terrestrial 5G user equipment	750	B	750	0	C		07/10/2021	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		17/11/2021	Y		2020
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	4,200		2,950	1,250						
5G.07 - 5G HUB OVER-THE-AIR DEMONSTRATIONS											
2-018	5G Hub over-the-air technology validations	1,500	B	1500	0	C			Y	awarded	2020
2-019	5G Hub over-the-air vertical segment validations	1,500	B	1500	0	C		25/10/2021	Y		2020
	subtotal	3,000		3,000	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	Q4 2021				2020
2-021	Demonstration of direct 5G broadband access from LEO to small aperture terminals	3,500	B	3500	0	C		02/03/2022	Y		2020
	subtotal	8,000		8,000	0						
	TOTAL (k€)	17,800		16,550	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.