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Distributed Sensing, Computing, Communication, and Control Fabric: A Unified Architecture for new 6G era

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Abstract—**With the advent of the multimodal immersive communication system, people can interact with each other using multiple devices for sensing, communication and/or application level control either onsite or remotely. As a breakthrough concept, a distributed sensing, computing, communications, and control (DS3C) fabric is introduced in this paper for provisioning 6G services in multi-tenant environments in a unified manner. The DS3C fabric can be further enhanced by natively incorporating intelligent algorithms for network automation and managing networking, computing, and sensing resources efficiently to serve vertical use cases with extreme and/or conflicting requirements. As such, the paper proposes a novel end-to-end 6G system architecture with enhanced intelligence spanning across different network, computing, and business domains, identifies vertical use cases and presents an overview of the relevant standardisation and pre-standardisation landscape.**

Keywords—6G architecture, vertical requirements, multimodal distributed communication, distributed sensing and control, distributed computing, metaverse, DS3C fabric

I. Introduction

In the 5G era, mobile communication system performance has significantly improved compared to previous generations. However, the methods for deploying, managing, and operating the network have not seen substantial advancements. Managing data and services across different technical and business domains remains complex, leading to issues such as usability, data ownership, and security. 5G is designed with a strong emphasis on public network services and utilizes customisation to address specific industry needs. Network slicing is a key feature introduced in 5G that involves creating virtual networks within a public network to cater to industry requirements. Network slicing primarily focuses on the Core Network (CN) concept in the 3rd Generation Partnership Project (3GPP), aiming to provide isolated network functions and resources to a large number of subscribers using a shared public network.

The business model of 5G promoted the value of customised Service Level Agreement (SLA) for industry customers. Mobile operators have good experience in providing SLA for public services. However, SLA and corresponding management schemes for vertical sectors are new topics in the telecommunications domain. The 5G Alliance for Connected Industries and Automation (5G-ACIA) have shared their view on guaranteed Service Level Specification (SLS) i.e., the technical part of an SLA [1], which specifies the vertical needs on the SLS and the gaps that should be addressed by future mobile communication systems. Within the industrial domain, vertical customers often prefer data to remain within their premises at a local (edge) cloud for reasons beyond performance requirements such as data privacy and security. It is foreseen that edge computing will be a major trend for the next decade. To this end, a challenge would be to interconnect all distributed resources at the edge at large scale instead of having many isolated data islands.

It is envisioned that 5G and 5G-Advanced technologies will span across multiple releases (Rels), including Rel-18, Rel-19, and perhaps Rel-20 and beyond and still has room to improve to fully embrace the requirements of different vertical industries. Even though gradual improvements such as the network slicing in Radio Access Network (RAN) advancements are promised by 5G standardisation, radical system architecture changes are expected to better respond to capture vertical needs to meet a true end-to-end (e2e) vision with guaranteed performance for different services, ranging from edge computing to Internet of Verticals (IoV) [2] and integrated sensing and control. With the current picture of 5G research and standardisation progress and the feedback from commercial adaptation, especially from vertical industry sectors, it is clear that there is a need to move towards a new system architecture, which could address the discussed gaps and challenges through an innovative design. This requires a holistic research approach towards the needed technology, with a value chain perspective.

From a comprehensive system perspective, the target is to develop a unifying network architecture featuring orchestration, and Artificial Intelligence/Machine Learning (AI/ML) models and frameworks to offer distributed and reliable sensing, communications, computing, and application level control (e.g., actuation) services over 6G. In this paper, we introduce a new innovating 6G architecture based on a proposed Distributed Sensing, Computing, Communication, and Control (DS3C) fabric, which will serve as a distributed intelligent network that will craft the real-time interactions between human, physical, and digital worlds, helping to set up a new era in which everything could be sensed, connected, and controlled.

II. The DS3C motivation and concept

Considering the huge business opportunities in industrial automation, healthcare and consumer market use cases (UC), a unified communication service to deliver data and support application level control and actuation is required. Therefore, it is essential to design a 6G system architecture that could tackle such requirements from a high-level perspective, referred to as intents, and transform them into low-level needs, i.e., resources to be allocated leading to meeting the service KPIs/SLAs. For example, a sub-millisecond latency is demanded for services based on human haptic perception in collaborative robots (cobots), as well as long range remote operation which are currently not supported by 5G systems. Moreover, the heterogeneity of services imposes a big challenge to handle with a unified service provisioning system. UCs with extreme requirements can be categorised based on their interaction types between human, digital, and physical worlds, and the service area: local interactions e.g., between mobile cobots and operators on a factory floor;

remote operation such as tele-surgery; and meta-interaction such as collaborative design between engineers in different locations over metaverse (MV). The MV use case presents an interactive exchange of information between physical and virtual objects. One example is the utilisation of a meta-robot that replicates the actions of a physical robot and is supervised by multiple operators located in different geographical locations. This eliminates the need for experts to be physically present at factory sites for maintenance and checks. The meta-robot has the capability to communicate autonomously with human operators, other physical users and controllers, as well as collaborate with other meta-robots using network capabilities. To ensure secure access to network capabilities, a trusted metaverse environment will be established, where the meta-robot autonomously employs authentication methods. All tasks performed and knowledge acquired in both the physical world and metaverse will be shared in a distributed virtual environment across the DS3C fabric. This facilitates collaborative and cooperative engineering in product design, involving engineers who participate both locally and remotely. For instance, engineers can collaborate with partner companies to design and manufacture a new engineering product, using mobile phones, computers, XR devices, and tactile gloves to attend engineering meetings.

The DS3C fabric concept is motivated to address current challenges for an e2e service delivery as detailed in the following.

A. *Network Orchestration*

To reduce or ideally eliminate the manual intervention, improving autonomous management capabilities and functionalities is needed. This can be done based on closed-loop automation and AI/ML algorithms for predictions and proactive decision making, particularly for provisioning, monitoring, self-organisation/optimisation, self-healing, and performance assurance. These constitute the pillars to attain effective e2e service lifecycle management over cross-domain and multi-technology infrastructures, as defined by ETSI Zero-Touch Service Management (ZSM) [2].

B. *Native Support Requirement for AI/ML in 6G*

AI/ML models can be used to solve complex or currently intractable problems for handling network management tasks (e.g., traffic forecasting, anomaly detection, and resource allocation), paving the way towards zero-touch network and service management systems [2]. AI/ML could be used in different layers to adaptively optimise and enhance resource utilisation to further push the performance boundaries in cellular systems. For instance, at radio link layer, resource scheduling or link adaptation can be better implemented through radio channel or user equipment location prediction. At network layer, AI/ML can be used for traffic prediction and anomaly detection. 5G has begun to integrate AI/ML in its architecture design, e.g., by introducing the Network Data Analytics Function (NWDAF) [3] to the 5G Core for the automation and optimisation of the related network functions (e.g., AI/ML-based mobility management). The role of NWDAF function is to collect and analyse data from other 5G network elements to train AI/ML models that can be used by network services. Meanwhile, a similar mechanism like collecting and analyzing data based on the existing Self-Organising Networks and Minimisation of Drive Tests (SON/MDT) is adopted for 5G radio access networks (RAN). Furthermore, current research on AI-based RAN/CN architecture is decoupled into two main streams: 1) definition of architectural frameworks covering aspects such as modules and interfaces, along with problems of data collection, model training, deployment and life cycle management, and 2) AI/ML architectures suitable for different, usually intra-domain resource management tasks. Open-source communities such as the ETSI OSM and ETSI ONAP have delivered initial open-source management and orchestration implementations in 5G.

C. *Beyond communication*

The edge computing concept has emerged in parallel with the development of mobile communication systems. It could be considered as a distinguished form of cloud computing that moves part of the processing and data storage resources away from the central cloud to the edge cloud located physically and logically close to the data providers and data consumers [5]. ETSI has been investigating this topic under its Multi-access Edge Computing (MEC) Industry Specification Group (ISG) for mobile communication systems [6]. MEC features the Radio Network Information Service (RNIS) interface, which exposes various RAN information to the Edge platform though a dedicated API; the latter is also the focus activity in the 3GPP SA6 group.

Furthermore, communication and application level control co-design motivated further integration in communication system in two main categories: 1) control of networks, 2) control over networks [7]. While the first category focuses on satisfying the QoS requirements of Networked Control Systems from the communication network's perspective, the second aims at mitigating the performance loss due to the network's limitations within the application layer. In essence, the key idea of communication, control and actuation co-design is to consider the dynamics of the control system as well as the network's characteristics jointly to improve the overall performance of the system. This is different from the conventional methods and trends in networking research, as the primary goal is not to maximise throughput or minimise latency but rather to guarantee stability or maximise control performance.

III. THE DS3C-BASED 6G ARCHITECTURE

The role of the DS3C fabric is to coordinate distributed resources in an intelligent manner, to sense and collect physical world information via a communication, sensing, and computing platform and utilise them especially for the control and actuation domain as shown in Fig. 1. In this way, the physical world information could be managed in the virtual world (e.g., Digital Twin) and the knowledge that is extracted from such information could be fed back and leveraged by the physical world. In DS3C, a control loop is closed via the common communication network, which multiplexes digital data from the RF or non-RF sensors to the controller, and from the controller to the actuator along with the multimodal traffic from other control loops and management functions. Distributed computing and AI/ML will enable accurate sensing and modelling over unique user interfaces essential for the computing system to communicate with the controller and with interfaces for executing the actuation commands.

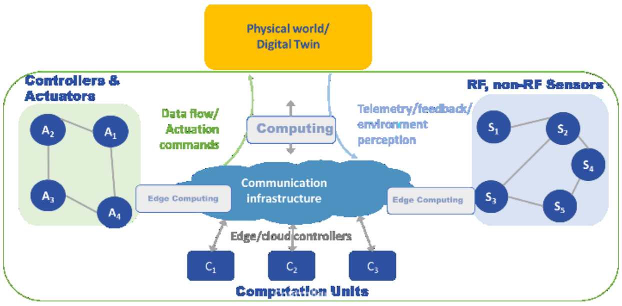

Fig. 1: The main DS3C fabric components

The DS3C is a comprehensive solution for mobile communication, integrating intelligent management and automation of resources across the 6G network. It includes prediction and monitoring of service parameters, intelligent resource management across network domains, and integration of sensing, ultra-reliable low latency communications, and edge computing. The system also automates the discovery and abstraction of underlying resources, including communications, computation, sensing, and application level control. It also integrates with AI-empowered frameworks for network orchestration and resource-related decisions. The DS3C fabric can sense and process information in real-time, make intelligent decisions, and adapt to changing network conditions to optimize performance. This integrated approach ensures efficient and effective mobile communication services. Composed of four hierarchical stratums: the network, application level control, network intelligence, and sensing stratum, the high-level architecture that relates the DS3C fabric with the underlying strata is presented in Fig 2.

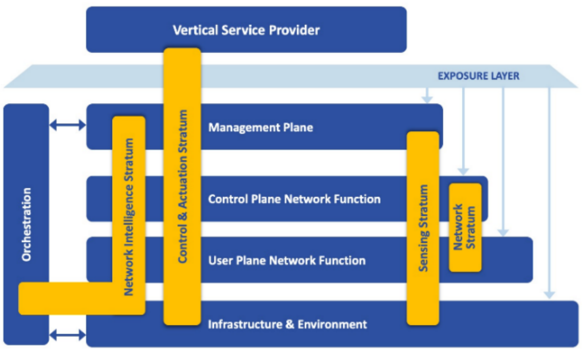

Fig 2: The DS3C strata

DC3C fabric extends the three strata defined by [9] with additional control & actuation stratum which includes functions for execution of control algorithms to generate commands e.g., to actuate (and calibration) robot/shadow structure based on environment perception (e.g., input from Sensing stratum).

In summary, the optimised automation of the DS3C fabric will be based on three technical pillars, which can be briefly summarised as: i) AI-based prediction and monitoring (thereafter AI-PM) trained models integrated in the DS3C fabric at different hierarchical levels to serve resource management at local and global level, ii) AI-driven holistic resource management (thereafter AI-HRM) aiming at the coarse resource allocation vertically, across different domains, and horizontally, across different edge sites, iii) AI-driven domain-specific resource management (thereafter AI-DRM) covering the sensing, communication and compute domains and sharing information and policies with the holistic resource management framework. The key components of the proposed DS3C-based architecture are depicted in Fig. 3 and summarised below.

A. *Edge platform*

Adopting an existing, preferably open framework (e.g., ONF's Aether, Intel's Smart Edge Open, OpenNebula) facilitates the configuration of network control plane functions and edge node management services (e.g., virtualisation infrastructure, container runtime environments). The virtualisation capabilities of the Edge platform will be extended to support the partitioning of accelerated functions in different co-processing elements (i.e., GPUs, FPGAs, Superscalar processors). The edge platform will also interact with the data collection and pre-processing framework.

Two-level orchestration layer

Local site orchestration is used to leverage the complete compute, memory, and I/O blueprint of the site to be able to optimally exploit the allocation of resources in the underlying heterogeneous hardware substrate. Towards this end, current orchestration solutions will have to be extended in the context of the DS3C fabric, to introduce the notion of specialised micro-orchestrator modules, controlling specific physical or logical computing entities of the local site and able to apply field partitioning of the computational workloads and tasks (e.g., covering both application and network functions). The local site orchestrator will also feature ETSI MEC-compliant interfaces and establish bi-directional connectivity with other control entities at RAN and transport levels. The automation operations will be achieved adopting closed-loop through the AI-DRM pillar. This can make use of (integrated) open-source solutions like the "Eclipse fog05", ETSI TeraFlowSDN, ETSI OSM, that will provision and manage decentralised compute, storage, communication, and control resources across the network infrastructure.

Cross-site unified orchestration will provision and deploy the e2e service orchestration covering multiple edge sites and considering the entire edge-to-cloud compute continuum. The closed-loop automation will be achieved through the AI-HRM and by integrating distributed AI solutions and data-intensive workflow task schedulers. Moreover, a custom interface with the e2e slice manager will be built in 6G to enable the cross-domain implementation of joint computing and network resource allocation and policy distribution, satisfying specific requirements of SLAs, KPIs and UCs.

B. *Data collection and pre-processing*

This module leverages different monitored metrics across the DS3C fabric, exposed by the sensing, the computing infrastructure (i.e., the edge platform and the orchestrator), the network and the application domain. This layer will feed the AI-PM module that is described in the following subsections.

C. *AI Prediction and Monitoring (AI-PM) module*

AI-PM module will host AI models for AI prediction and monitoring (anomaly detection) and will be flexibly instantiated and deployed across different domains and locations. Both training the AI models and their deployment for inference tasks will be done at AI-PM module based on the data retrieved from the Data collection and Pre-processing module. AI models hosted by the AI-PM module will predict main system parameters: system load, the resource usage and KPIs. These predictions will be forwarded to resource

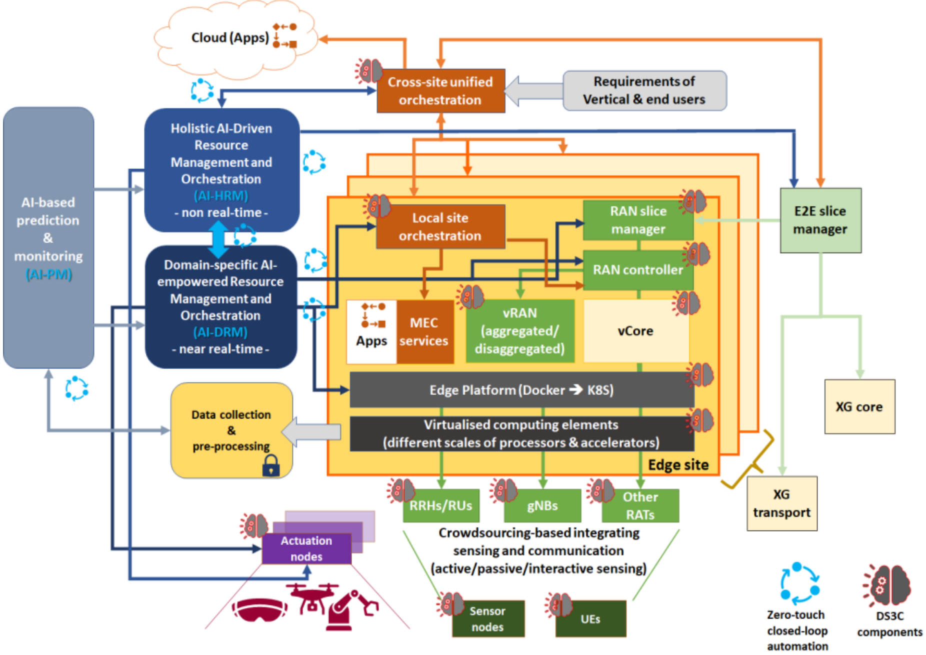

Fig 3. Proposed 6G architecture based on the DS3C fabric

management modules AI-HRM and AI-DRMs for further decision making. Predictions will be made based on incoming data and AI models for monitoring and detecting anomalies in case the system state and KPIs are deviating from the expected behavior. Information on detected anomalies will be sent to the AI-HRM and AI-DRMs for decision making. The AI-PM will host AI models for different prediction and monitoring tasks, each of which may exploit different deep learning (DL) architectures and approaches. The pre-trained deep neural networks will be applied along with the use transfer learning algorithms to fine-tune non-stationary 6G mobile networks, likewise improving learning efficiency and performance. When deployed in scale, AI-PM predictors can use federated learning to improve their performance.

D. Domain-specific Resource Management (AI-DRM)

Domain-specific RM modules will be deployed across the central and edge sites to support decision making within different network domains. The AI-DRM modules will receive inputs from AI-PM modules in the form of data streams, predictions, and anomaly events. These inputs will feed AI models hosted within the AI-DRM modules. AI models will be trained at the AI-PM module and deployed for inference tasks at the AI-DRM module to avoid significant data flows among the deployed AI-PMs and AI-DRMs. Due to variety of resource management tasks at different domains, their interaction and data sharing within each AI-DRM module will be needed and this will constitute one of the main challenges of AI-DRM design. In other words, careful balance between simple AI models targeting specific tasks and more complex multi-task AI models will be explored as part of the AI-DRM architectural choices. The outputs of the AI-DRM module will feed various network controllers and orchestrators (e.g., RAN controller, edge platform orchestrator) for resource allocation decisions. These decisions will be updated through interaction with AI-HRM to reach a consensus on e2e resource allocations.

AI-DRM will host a rich collection of different AI models for domain-specific and task-specific resource management. Examples include a collection of radio resource management tasks for radio resource allocation, beam management, RIS management and control, resource management and control related to sensing and spectrum sharing. Multi-task learning with DNNs and DRL can aggregate activities on different resource management tasks, and thus produce more efficient and lower footprint models. Resource management DL approaches can rely on data-based constrained DRL methods and model-based active inference approaches.

E. Holistic Resource Management (AI-HRM)

This is a central module that will manage e2e resource allocation in a holistic manner. It will receive inputs from AI-PM in the form of data streams, predictions and anomaly events and will trigger resource management decisions at the highest hierarchical level. The AI-HRM will respond to dynamically changing vertical service intents and network anomalies and for each such inputs a two-phase procedure will be followed. In the first and time-critical phase, AI-HRM will react with resource management decisions that will provide the best high-level response to the received inputs. In this way, service continuity and provisioning of requested SLAs will be maintained with high resilience. In the second phase, information exchange through distributed message-passing between AI-HRM and relevant AI-DRMs will follow, where resource allocation optimisation will evolve through consensus-based methods.

The AI-HRM module will host AI models for RAN, transport, CN slicing decisions that receive inputs from the AI-PM module in the form of data streams, predictions and anomalies. It will exchange information with the AI-DRM modules during the resource optimisation (hardening) phase. Responsive AI models for initial and fast network (re)configuration will use graph neural network (GNN)-based models and constrained-based DRL models. Joint system optimisation between AI-HRM and a selected subset of AI-DRMs will rely on consensus-based DRL models. Table I. shares a summary of the scope, key functionalities and type of AI/ML solutions that could be hosted or deployed in each of the three AI orchestration components of the DS3C fabric is given in AI-driven building blocks of the DS3C fabric.

Module	*Scope*	*Key functionality*	*Type of AI/ML solutions*
AI-PM	Accurate system state prediction	Integration of relevant Age of Information and Value of Information metrics	Recurrent neural networks with LSTM or GRU units Transfer learning, Hierarchical learning: federated learning and meta learning
	Anomaly detection	Detect the system evolved to an unexpected state	Unsupervised deep autoencoder (AE)-based anomaly detection
AI-DRM	Resource management decisions in different domains	Design a collection of AI models for different resource management tasks. Find the right granularity of AI models and their interaction.	Constrained deep reinforcement learning (DRL), multi-agent DRL, Active inference, Federated learning, multi-task learning
AI-HRM	End-to-end resource management	Design a central AI model for holistic resource management and its interaction with a collection of local AI-DRM modules	Message-passing Graph neural networks (GNN), Consensus-based multi-agent DRL, Consensus-based methods, Constraint-based AI models

IV. DS3C FABRIC NOVELITY & SOLUTIONS

Unified Network orchestration: The proposed orchestration platform relies on a hierarchical approach: i) the higher-layer orchestrator interacts with the verticals (mapping intents/high-level requirements to low-level requirements/KPIs) and handles the service lifecycle (e.g., planning, optimisation, and SLA assurance) from an e2e perspective. This higher-layer element coordinates multiple domains/technologies (i.e., sensing, computing, networking, and application level control) to configure the underlying resources. Ii) the lower-layer entity is formed by a pool of dedicated domain controllers bound to a specific technology/segment (e.g., computing, sensing, RAN, transport). The DS3C fabric aims to provide APIs between the building elements to achieve the autonomous functions, and also defines a data modelling which abstracts the heterogeneous attributes and capabilities of every domain.

Native Support for AI/ML in 6G: NWDAF is a crucial component in supporting AI/ML, serving as a placeholder for AI/ML-related purposes. In DS3C, a unified system architecture can be defined, providing native support for AI/ML inclusion. This facilitates data governance and system orchestration, focusing on architectural aspects rather than functional aspects. Rapid and accurate decisions are necessary for intelligent resource management, requiring novel data sources like sensing capabilities, channel state information, reconfigurable intelligent surfaces (RIS), beam configurations, and precise localization. The DS3C intelligent fabric design focuses on energy-efficient AI/ML model training, robust inference, and economic life-cycle management of AI models. The goal is to minimize data consumption while selecting models with minimal parameter and training complexity.

ISAC technology enabler: The 6G technology is expected to enable simultaneous communication and sensing, utilizing radio frequency (RF) signals in mmWave/THz bands for high resolution Radar and Ultra-Wide Band (UWB) wireless localisation signals. This functionality can be used for virtual or augmented reality applications in smart cities and factories. The DS3C fabric advocates for the integration of sensing functionality into mobile communications and computing infrastructure to provide real-time telemetry for monitoring, predicting, and resource management in 6G. Sensing can be integrated at different levels, ensuring improved spectrum sharing and multiplexing in time, frequency, and space. The DS3C fabric aims to leverage a crowdsourcing solution to deliver an ISAC framework at the network edge, based on active sensing, passive sensing, and interactive sensing. This paradigm could be used in multiple UCs such as area imaging, activity recognition, spatial-aware computing, localisation and mapping, and RF maps.

Converged Communications and Computing Networks: The DS3C fabric aims at bringing the edge computing concept to a new level, enabling the so called "edge-cloud continuum", where edge and cloud are increasingly undistinguishable (i.e., used homogeneously by the service provision layer). 6G will employ this edge-cloud computing fabric to enable distributed and serverless computing for AI/ML applications exploiting, e.g., federated learning. This will unify distributed communication and computing resources from the access to transport and core, which will break the conventional physical boundaries of technology domains. Moreover, novel switching, resource run-time scheduling and management mechanisms that take all dimensions as well as constraints into account, will be inherent building blocks of the DS3C fabric. The converged DS3C fabric will address edge-specific requirements originating especially from vertical UCs, e.g., connecting resource constrained IIoT nodes with extreme and conflicting performance requirements.

Communication, application level control co-design:

The DS3C will embrace recent trends on communications application level control co-design which propose KPIs beyond the conventional ones used in today's communication networks such as age of information (AoI), which considers measuring information freshness in remote monitoring and control scenarios [7], age of incorrect information (AoII), urgency of information (UoI) as well as Value of Information (VoI) to quantify the application layer performance, as an alternative to latency, throughput or jitter. Each of these metrics captures a different aspect of control performance and offer great potential for future industrial networks. Furthermore, for UCs with actuation and control requirements, communication–control co-design methods require strong correlations between control and communication systems, i.e., control optimisation problem with communication constraints and communication optimisation problem with control constraints. To achieve the latter, an effective co-design model should be built to help with communication and control optimisation.

V. STANDARDISATION ROADMAP

5G was introduced as a native service-based architecture (SBA) [3GPP23.501] especially for the CN to support three main UCs: enhanced mobile broadband (eMBB), URLLC and massive machine-type communications (mMTC). Benefiting from the cloud and virtualisation technologies, the SBA in 5G is capable of dramatically reducing the specification complexity, especially on relevant network functions and interfaces, and procedure definitions for newly introduced services. Many new features (e.g., cellular IoT and URLLC) [3GPP23.501] are added on top of the design of network services provisioned for public network services with joint efforts of 3GPP System Aspects (SA) i.e., SA1, SA2, SA3, SA4, SA5 and SA6 from Rel-15 to Rel-19.

Such initiatives could be considered the first standardisation attempt to natively support edge computing in 6G. It is expected that the DS3C-related standardisation activities will take place in parallel, in multiple SDOs, and possibly in multiple stages; initially in the form of consensus on 6G vertical requirements and architectural design, and later through harmonisation of computing, communication, and application level control and their interfaces and APIs.

Currently, two 3GPP Working Groups (WGs) are active on these topics. Key vertical UCs (especially for factory and process automation) are studied in 3GPP SA1 [3GPP22.104] and SA6, [3GPP TR 23.745], whereas since 2021 the 3GPP SA2 also approved to investigate architectural enhancements for Extended Reality and media (XRM) services [3GPP26.928], which are also relevant to the verticals. SA2 takes requirements specified in SA1 such as [3GPP22.847] on tactile and multi-modal communication services for enhancing 3GPP system functionalities. Performance requirements for AI/ML Model Transfer (AMMT) in 5GS are amongst the relevant Rel-18 features that will pave the way for adding support to MV services in Rel-19. In this respect, the combination of haptics type of XR media and other non-haptics types XR media are expected to be analysed, identifying users and digital representations that interact within MV services, together with physical and digital information collected and used to enable MV services. Therefore, a feasibility study on localised MV services, wherein the potential MV engineered UCs and requirements are summarised [3GPP22.856].

Besides 3GPP, the ITU-T's Focus Groups on Machine Learning for Future Networks including 5G [FG-ML5G] and MV focus group [MV-FG] have drafted several technical specifications for ML for future networks, including interfaces, network architectures, protocols, algorithms and data formats [8], and the technical requirements of the MV to identify fundamental enabling technologies in areas from multimedia and network optimisation to digital twins, and environmental sustainability, respectively.

VI. Summary and Outlook

The proposed DS3C fabric is key to the 6G development at providing a unified, distributed, and agile framework to enable data pipelines coming from the entire sensing stratum. The DS3C articulates its operation by applying opportunistic data caching and pre-processing, and host the execution of high volume and highly complex computational workflows across a 6G-enabled and connected infrastructure of heterogeneous computational resources that includes distributed endpoints (e.g., embedded devices) with sensing and actuating capabilities, edge platforms (e.g., edge/cloud computing servers, fog nodes, micro-datacenters), and remote cloud datacenters.

To that end, the DS3C will architect a flexible and scalable edge processing design, blending the lifecycle management and closed-loop automation for cloud-native network functions, edge applications, and network services across a multi-level edge-to-cloud continuum. To achieve that, an underlying processor-agnostic framework will fully exploit the capabilities of general-purpose processors, and bit-intensive acceleration processing and communication elements, able to serve challenging processing loads and ultra-low actuation latency to meet the extreme UC KPIs. Finally, the 3GPP standardisation roadmap and relevant features indicate the route towards DS3C fabric components and required functionalities.

Standardis

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