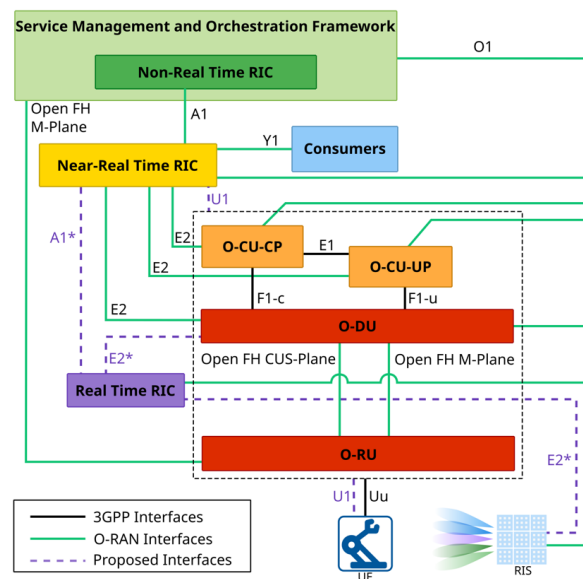


# Enabling 6G Smart Factories with O-RAN

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How can emerging technologies like mmWave, sub-THz transmission, Reconfigurable Intelligent Surfaces (RISs), and Integrated Communication and Sensing (ICAS) be effectively integrated into smart factory networks? What are the potential challenges and benefits of incorporating these technologies into the O-RAN architecture? How do the proposed additions, such as the Real-Time RIC (RT RIC) module, the new interfaces between Near RT RIC and UE, and the support for RISs, address the specific needs of smart factories?



*In response to the challenges posed by the emerging communication technologies, we are forging ahead with innovative solutions, including the design of the new Real-time RIC and novel interfaces within the O-RAN framework. The new real-time RIC architecture stands at the forefront of this evolution, offering dynamic orchestration and optimization capabilities essential for efficiently managing complex networks operating at sub-THz frequencies and interfacing with RIS deployments.*

## KEY FINDINGS

This paper has presented the challenges of implementing next-generation mobile networks in smart factory scenarios and discusses an extended O-RAN-based solution. Smart factories will require the network to support all the 5G foreseen service classes (eMBB, mMTC and URLLC) and more, which will require the application of novel technologies such as mmWave and sub-THz transmission, RISs, ICAS, among others. Upon these challenges, using a flexible and extendable architecture is key, thus raising O-RAN as the de facto candidate solution to be explored. However, the current O-RAN specification lacks additional components and definitions to sustain the envisioned future smart factory requirements fully. The proposed extensions include the addition of an RT RIC module and its companion interfaces, a novel interface between the Near RT RIC and the UE, the support for RISs, and a tighter integration between the O-RAN control and the underlying optical transport X-haul control. The road to proposing, standardizing, and implementing an architecture supporting the future smart factory mobile networks is long, has many crossroads, and is still incipient. Nevertheless, it is a stepping stone to achieving the future 6G networks.

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