

Unlocking cross-domain barriers in autonomous networks through digital twins

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Abstracts

The report examines the limitations of current telecom network automation, particularly amid growing complexity in infrastructure, services, and quality requirements. In an environment defined by increased virtualisation and the proliferation of cross-domain interactions, local optimisation is no longer adequate: decisions optimised at the domain level may actually undermine overall performance and impede the development of true end-to-end autonomy.

To address this fragmentation, the report proposes introducing a digital network twin capable of representing and simulating the network across all technical domains and the service layer. Through the federation and unification of data, along with an explicit mapping of dependencies, this digital twin provides artificial intelligence with a reference environment. This enables AI to explain network states, predict the impact of interventions, and recommend multi-domain optimisations.

The analysis also underscores the operational and economic challenges involved. The capability to simulate and balance trade-offs between performance, capacity, energy consumption, and service commitments is becoming a critical lever for mitigating risks related to network changes and for enhancing operational stability.

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