WIRELESS TIME-SENSITIVE NETWORKING

TECHNICAL FIELD

[0001] The present disclosure is related to wireless communications networks and describes network architecture, wireless devices, and wireless network nodes suitable for industrial applications, using a fifth-generation (5G) or other wireless communications network.

BACKGROUND

[0002] The fifth generation of mobile technology (5G) will be able to provide wider range of services than the existing 3G/4G technologies. Three main use cases of 5G are: Enhanced Mobile Broadband (eMBB), Massive Machine Type of Communication (mMTC) and Ultra Reliable Low Latency Communication (URLLC). A key objective of the 5G system is to be able to support the stringent system requirements from vertical markets. Those requirements include simultaneously supporting multiple combinations of reliability, latency, throughput, positioning, and availability, as well as, local deployments with local survivability, local data/routing, local managements, security, data integrity and privacy.

[0003] An industrial network perspective of 5G system is illustrated in Figure 1. The service performance requirements are coming from the automation applications. 5G system is providing the communication service to the automation applications. In order to support automation in vertical domains, 5G systems need to be reliable and flexible to meet service performance requirements to serve specific applications and use cases. They need to come with the system properties of reliability, availability, maintainability, safety, and integrity.

[0004] Specifications for 5G are under development by members of the 3rd-Generation Partnership Project (3GPP). The document “Service Requirements for Cyber-Physical Control Applications in Vertical Domains, Stage 1,” 3GPP TS 22.104, v.16.0.0 (Jan 2019), specifies the requirements that provide various sets of performance criteria that need to be met to satisfactorily support different use cases of cyber-physical control applications used by various vertical markets.

[0005] In the industrial applications space, requirements include support for mixed services in factory and manufacturing environments, including support for different service levels, such as massive Machine-Type Communications (mMTC), enhanced Mobile Broadband (eMBB), and ultra-reliable low-latency communications (URLLC) traffic in the same deployment. Support for industrial deterministic service is needed. Integration between the 5G System (5GS) and existing industrial networks is also required. Interoperability, including support for non-public networks and interoperability with the public land mobile network (PLMN) is required.