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Artificial Intelligence Towards the Evolution of Autonomous Networks Beyond 5G

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Introduction: As we move toward intelligent society and industry, AI is getting to be integrated into almost everything – learning, adapting, and intelligently automating. The important value of AI, however, isn't limited to applications that attach with the network; but will ultimately be realized within the networks themselves. This leads us into an era of intelligent, autonomous networks – serving up the speed, scale, and capacity of intelligent society and industry – with on the brink of zero-touch.

5G Network Infrastructure

5G network infrastructure is made from macro- and small-cell base stations with edge computing capabilities. Macrocells are the traditional cell towers that serve an honest area. During a 5G network, network functions that typically run on hardware become virtualized, running as software. Before 5G networks reach their full potential and become self-sufficient, most carriers are getting to be using existing 4G LTE radio access networks (RANs) augmented with some new antennas. This enables carriers to start out offering improved services while the new physical infrastructure is formed.

There are two options for a 5G network infrastructure,
1. Non-standalone (NSA)
2. Standalone

A non-standalone infrastructure relies on existing 4G LTE infrastructure and it provides some new technology like 5G New Radio (NR).

NSA architecture has the 5G RAN and the 5G NR interface working in conjunction with existing LTE infrastructure and core network. Standalone infrastructure refers to a 5G network that does not believe LTE networks and has its own cloud-native network core that connects to the NR. it's expected that network carriers will reach a standalone infrastructure after moving through an NSA infrastructure. Using an NSA approach allows carriers to provide 5G-like experiences while they build out the needed physical infrastructure of a 5G network.

The nature of 5G networks is virtualization. they're truly software-defined networks. Thereupon comes new network security challenges as operators are forced to rethink traditional focuses. For example, network slicing is that the isolation of data streams for the varied 5G usage scenarios: enhanced mobile broadband, massive machine-type communications, and ultra-reliable low latency.

AI towards the evolution of autonomous Networks beyond 5G

The diversity in stakeholders of the longer-term network which incorporates physical network infrastructure, spectrum availability & usages, service providers, and repair consumers poses challenges to the optimal allocation of resources as well as utilization. The signal propagation characteristics of 5G waveband derive a high-density infrastructure requirement, which leads the network operator to think about the deployment of a 5G network on public infrastructure (e.g. street furniture, public high-rise building, etc).

The top countries with 5G include South Korea, the UK, Germany, and the US. Since the primary commercial launches of the fifth generation of mobile networks in late 2018, these four countries have emerged as leaders because multiple companies in these countries have deployed networks and are selling compatible devices. Countries including Switzerland and Finland are up and comers in 5G development, as they have limited deployment.

Different countries are approaching multiple sorts of spectrum releases & allocations i.e. National license or localized license. Usages of wireless connectivity are evolving with unprecedented variety i.e. AR/VR, MTC, etc; In recent years, virtual and augmented reality have begun to require advantage of the high-speed capabilities of knowledge streaming technologies and wireless networks.

However, limitations like bandwidth and latency prevent us from achieving collaborative AR and VR applications. Fortunately, both researchers and engineers are aware of these problems and have begun to style 5G networks to help us to maneuver to the subsequent generation of virtual interfaces. Subsequently variety in social network of revenue & digital productivity campaign. Providing connectivity to serve this multi-faceted optimization makes the network operation to be significantly complex. To cope up with these challenges, the networks beyond 5G would require becoming fully autonomous and governed by AI.

Artificial Intelligence

Artificial intelligence (AI) refers to a group of functions performed by a computer or program which will complete a group of tasks. The tougher the tasks, and therefore the more dynamic the programming, the more 'intelligent' the machine is. AI is that the basis for software-defined networking (SDN), networking slicing, composable infrastructure, network performance management (NPM), and lots of more functions and systems.

AI promises to advance and automate processes both at the buyer level and at the enterprise level. It also works in conjunction with other technologies, like 5G, IoT, and machine learning. As AI continues to develop, it'll become further integrated with software that manages the network, storage, and compute. it'll also become integral to orchestrating network functions through network function virtualization (NFV) and virtualized network functions (VNF), also as virtualized radio access networks (vRAN) and 5G technologies.

What role will AI have within the mobile networks?

- AI is already being incorporated into networks, with a primary specialization in reducing cost, optimizing network performance, and building new revenue streams.
- AI is going to be vital for improving customer service and enhancing customer experience.
- AI will help recoup the investments communications service providers (CSPs) are making in their networks to modify to 5G.
- Adopting AI is creating new data challenges, whilst it solves network complexities.

Scenario-based and personalized are the basic features of AI applications. In the future, the number of AI cases in telecom networks will be unimaginable. Integrated AI framework and standard workflow are necessary to effectively support massive AI cases and achieve sustainable development of network automation. What is more, as AI is enhancing RAN automation, we also need to apply AI to leverage reactivity, complexity, and openness.

We believe that AI will open up more opportunities for the mobile communications sector, as it can be used to form a more personal approach for customers while helping to manage the costs of deploying and maintaining networks. The industry needs more cooperation and a more open attitude to incubate various use cases, and so as to accelerate the implementation of autonomous driven networks (ADN). The integration of AI and communication networks will inject new vitality into mobile networks and open up unprecedented possibilities to bring the promise of AI and 5G to reality.